

**2006 Data Summary
Missouri Nutrition Surveillance System**

Pediatric Nutrition Surveillance



Missouri Department of Health and Senior Services

PREFACE

This document summarizes selected key pediatric health indicators of infants and children, age from birth to 5 years, participating in the Missouri WIC Program in 2006, which contributed to the Missouri Pediatric Nutrition Surveillance System in 2006.

Missouri Department of Health and Senior Services

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EXECUTIVE SUMMARY

The Pediatric Nutrition Surveillance System (PedNSS) is a national surveillance system created and maintained by the Centers for Disease Control and Prevention (CDC). The purpose of this system is to monitor the growth status of children of low-income families in federally funded maternal and child health programs. In 2006, the Missouri PedNSS was composed of data collected exclusively from infants and children participating in the Special Supplemental Nutrition Program for Women, Infants and Children (WIC). Thus, this report describes the growth status of children from low-income families in Missouri from birth up to the fifth birthday during the calendar year 2006. The data on growth (birthweight, short stature, underweight, overweight) and anemia (low hemoglobin/hematocrit) status of infants and children, and the breastfeeding practices of their mothers were collected in WIC clinics, analyzed by CDC, and used in this report.

Low and High Birthweight

Low birthweight is the single most important factor affecting neonatal mortality and is a determinant of post-neonatal mortality. In Missouri, very minimal improvements in low birthweight have been observed in the PedNSS population from 1997 to 2006. In 2006, low birthweight remained an area of greatest concern for the Non-Hispanic Black racial and ethnic group (12.8%). However, the prevalence of high birthweight has been slightly decreasing since 1997, and it was 6.6% in 2006. Hispanic and Non-Hispanic White groups had relatively higher proportions of being born overweight (8.3% and 7.1% respectively).

Short Stature

Short stature is an indication of chronic malnutrition. The Missouri PedNSS rates for short stature have been in general increasing from 1997 to 2006. The highest prevalence of this pediatric health indicator was shared among Non-Hispanic Black and Non-Hispanic White race/ethnicities (7.5% and 7.2% respectively) in 2006. The rates in short stature decreased with the age of the infants and children in 2006.

Underweight

Weight and height were measured to assess the growth status of children participating in the WIC program. In Missouri, the prevalence of underweight has been slightly declining from 1997 to 2006. The highest prevalence was in Non-Hispanic Black infants and children (7.6%). Infants (under 12 months of age) had the highest rate of being underweight compared to the other age groups.

Overweight (Birth to 5 Years)

The rate in overweight of infants and children (birth to 5 years) who participated in Missouri PedNSS had been increasing during the previous years, but declined slightly for the first time in 2005 (11.8%), and remained at the same level in 2006. American Indian/Alaskan Native and Hispanic infants and children had higher rates of being overweight (17.2% and 16.3% respectively), while Non-Hispanic Black and Asian/Pacific Islander infants and children had lower rates of being overweight (10.6% and 11.0% respectively). The proportion of overweight infants and children fluctuated with age – the 12-23 months age group showed the highest rate of overweight (17.9%) in 2006.

Overweight and At Risk for Overweight (2 to 5 Years)

Over the past 10 years, the rate of at risk for overweight has been increasing among Missouri's PedNSS children, age 2 to 5 years, except that the rate of being overweight for this group of children decreased slightly from 13.8% in 2004 to 13.4% in 2005. In the Missouri 2006 PedNSS, the highest rates of being overweight (19.4%) and at risk for overweight (17.8%) were among Hispanic children. The proportions of children who were overweight and at risk for overweight increased with age.

Anemia (Low Hemoglobin/Hematocrit)

In Missouri, the prevalence of anemia (low hemoglobin/ hematocrit) decreased from 18.1% in 1997 to 16.2% in 2003, but has increased since then to 17.5% in 2006. More than one fourth of the Non-Hispanic Black PedNSS infants and children in 2006 had low hemoglobin/hematocrit.

Breastfeeding Initiation

The percent of women initiating breastfeeding in Missouri's WIC program has been increasing over the last 10 years. The Non-Hispanic Black infants had the lowest rate of being ever breastfed (42.6%).

INTRODUCTION

The Pediatric Nutrition Surveillance System (PedNSS) is a child-based public health surveillance system that monitors the growth status of nutritionally at-risk children in low-income families¹ who participate in federally funded maternal and child health programs. The goal of PedNSS is to collect, analyze, and distribute surveillance data to assist in planning public health nutrition interventions.

In 2006, the Missouri PedNSS represented infants and children who were enrolled in the Special Supplemental Nutrition Program for Women, Infants and Children (WIC). Data were collected for infants and children up to the fifth birthday, who visited WIC clinics for routine care and nutrition services, including nutrition education and supplemental food. In 2006, the data included demographic information (race/ethnicity and age of the participants), birthweight (low birthweight, high birthweight), growth (short stature, underweight, overweight, at risk for overweight), anemia (low hemoglobin/hematocrit), and breastfeeding initiation.

This report summarizes 2006 PedNSS data, highlights trends on key indicators from 1997 through 2006, monitors the Healthy People 2010 Objectives, and compares Missouri PedNSS with the national PedNSS on selected indicators.

In 2006, the Missouri PedNSS reflected 175,727 records on 138,503 infants and children less than 5 years of age. There were 23,077 infants and children from Jackson County. St. Louis City was represented by 13,697 infants and children who participated in WIC in 2006, and 8,447 infants and children from St. Louis County were included in the analysis. The largest number of records contributed from one clinic was from the Springfield-Greene County WIC agency that collected data on 6,339 infants and children.

Limitations of the Pediatric Nutrition Surveillance System

The PedNSS was established to monitor the health status of low-income infants and children. In Missouri, only the WIC program contributed to the PedNSS; therefore, the Missouri PedNSS does not represent all low-income infants and children. Also, care must be taken when comparing PedNSS among states and the national PedNSS, as the demographic composition differs among the WIC populations in the various states. Plus, the PedNSS population in some states includes children in low income families from other programs in addition to WIC. However, PedNSS is a unique data set. It is the largest, most diverse (racially, ethnically, and geographically) data set available on infants and children from low-income families. The contribution of only WIC data to the PedNSS in Missouri² allows easier application of the conclusions and recommendations to WIC participants from birth to 5 years of age. Thus, it helps determine risk factors to assist in planning interventions to decrease infant mortality and nutrition-related health problems among the state's WIC participants.

¹ Potential WIC participants may have a household income up to 185% of the federal poverty level. However, participation in other health, social service or MC+ programs may allow for WIC participation at even higher income levels. Please see the 2007 HHS Poverty Guidelines on the website: <http://aspe.hhs.gov/poverty/07poverty.shtml>.

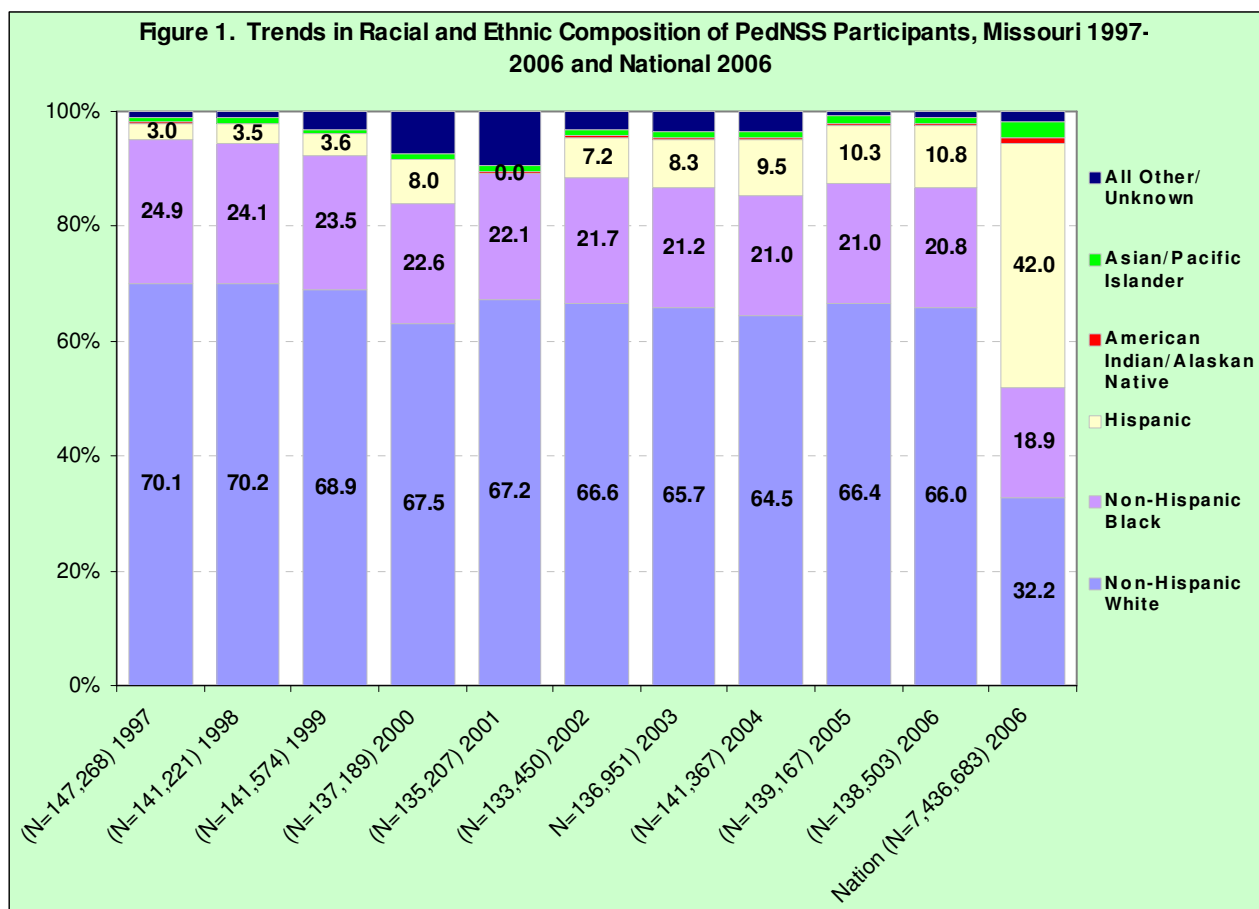
² In Missouri, WIC is the only program that contributes data to the national PedNSS. In 2006, 83.5% of the national PedNSS records were contributed by WIC programs of participating states. Other records were contributed by programs of Child Health-HMO (9.8%), EPSDT (Early Periodic Screening, Diagnosis, and Treatment) (6.1%), and Child Health-MCH (0.6%).

DEMOGRAPHIC CHARACTERISTICS

Demographic information, such as race/ethnicity and age, was associated with differences in birth outcomes, greater health risks and poor growth status of infants and children. The impact of these characteristics on key pediatric health indicators will be discussed throughout this report.

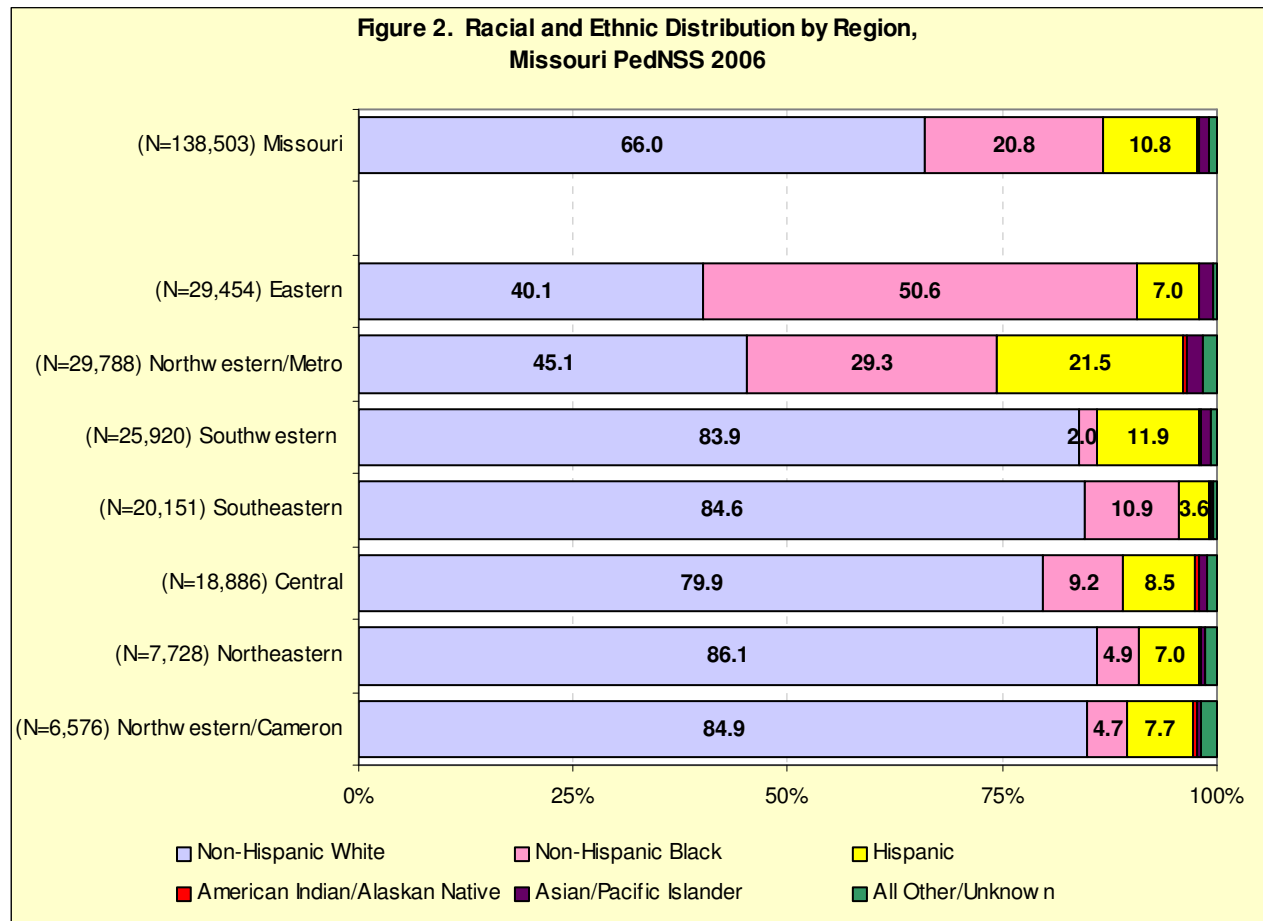
Race/Ethnicity

In the Missouri 2006 PedNSS, 66.0% of all children that participated were Non-Hispanic White, 20.8% were Non-Hispanic Black, 10.8% were Hispanic, 0.3% were American Indian/Alaskan Native, and 1.1% were Asian/Pacific Islander. Racial and ethnic composition of PedNSS participants has been changing over the last 10 years (Figure 1). The proportion of Hispanic children has been increasing from 3.0% in 1997 to 10.8% in 2006. Compared to the National PedNSS, the Missouri PedNSS proportions of Hispanic (10.8% in Missouri and 42.0% in the nation) and Asian/Pacific Islander children (1.1% in Missouri and 2.6% in the nation) were smaller, while the proportions of Non-Hispanic White and Non-Hispanic Black children were larger.



Note: The percentages for only the large racial and ethnic groups were shown on Figure 1. In 2001, the proportion of infants and children of Hispanic ethnicity remained unknown due to a definition change.

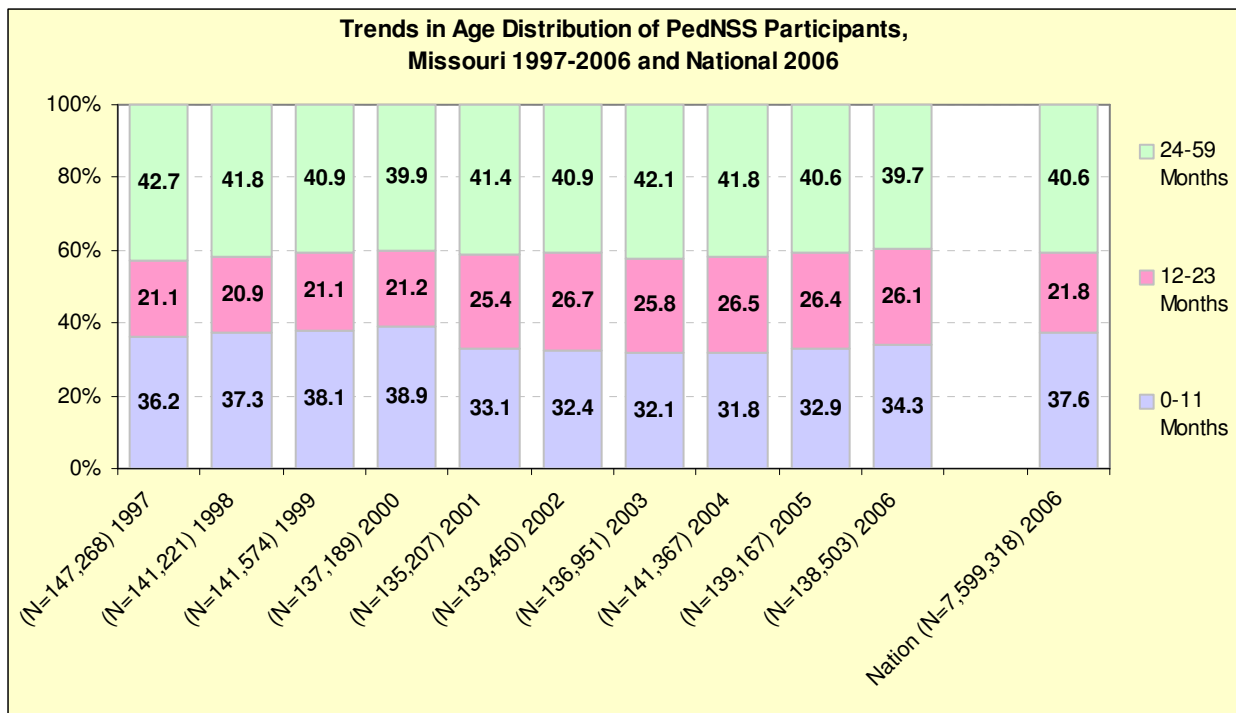
The racial and ethnic composition in Missouri differed between the rural and urban regions (Figure 2). The percentages of Non-Hispanic White participants in the urban regions of Eastern and Northwestern/Metro reflected only about half as many as were in the other, primarily rural regions. For example, Non-Hispanic White children in the Northwestern/Cameron region made up about 84.9% of the PedNSS population, while in the Eastern region this racial/ethnic group was 40.1% of the PedNSS population. The largest percentage of Non-Hispanic Black PedNSS participants (50.6%) was in the Eastern region and the smallest was in the Southwestern region (2.0%). The Northwestern/Metro region had 21.5% Hispanic children, while the Southeastern region had only 3.6%.



Note: The percentages for only the large racial and ethnic groups were shown on Figure 2.

Age

In the Missouri 2006 PedNSS, about two thirds of the participants (65.8%) were children age 12 to 59 months, and about one third of the participants (34.3%) were infants age 0-11 months (Figure 3). These proportions have changed slightly during the past 10 years. Nationally, 37.6% of PedNSS participants in 2006 were younger than 12 months, 21.8% were age 12-23 months, and 40.6% were age 24-59 months.

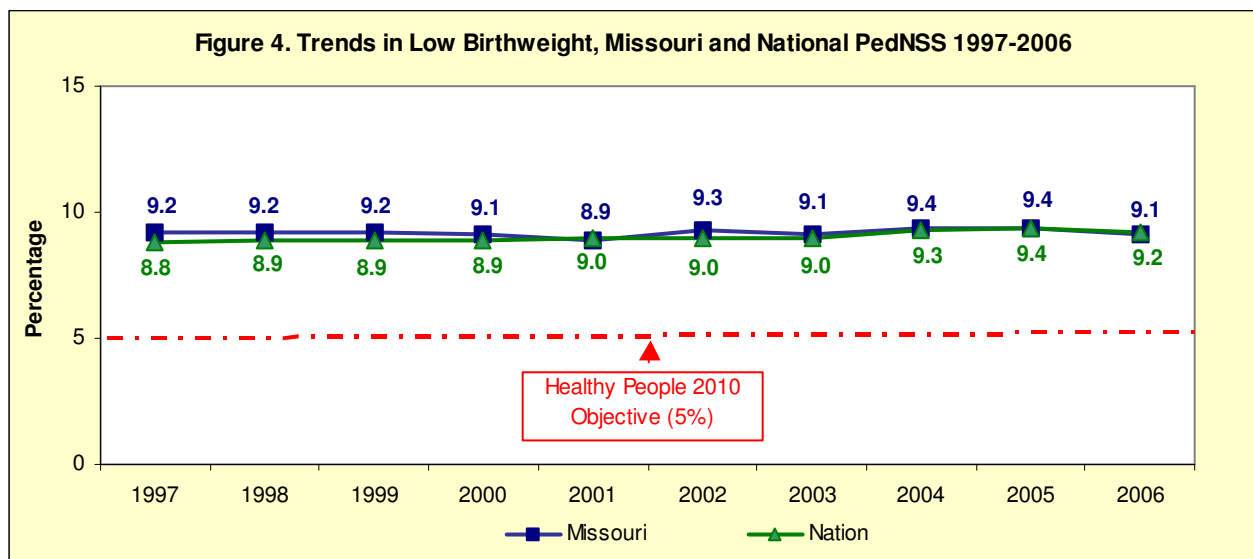


PEDIATRIC HEALTH INDICATORS

Low Birthweight³

Low birthweight (less than 2,500 grams or 5.5 pounds) is a major determinant of neonatal mortality and post-neonatal mortality [1]. Infants with low birthweight are more likely to experience developmental delays and disabilities than infants with normal birthweight [2]. The main factors that can lead to low birthweight include poor maternal nutrition and maternal risky behaviors, especially smoking, drinking alcohol and the use of non-prescribed drugs. Some researchers suggested that regular intake of the recommended amount of folic acid and micronutrient supplements throughout pregnancy may reduce the risk of having a low birthweight baby [3, 4]. The Healthy People 2010 Objective seeks to reduce low birthweight to 5% of all live births.

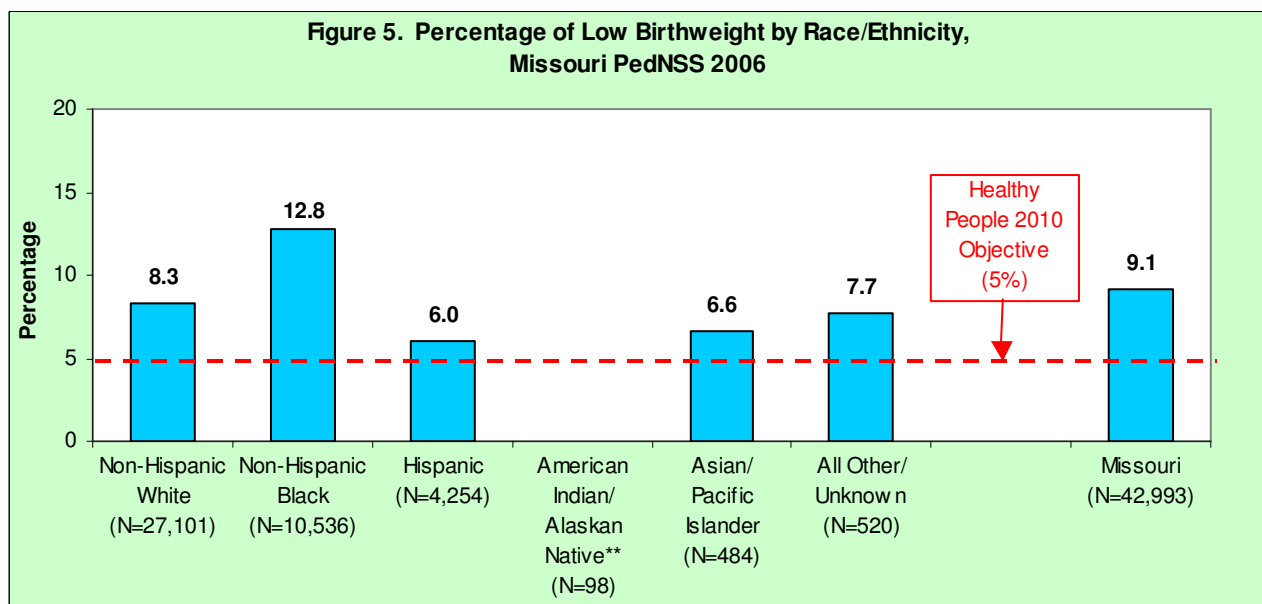
³ Refer to the map in [Appendix 1](#) to see the prevalence of low birthweight by county (Missouri PedNSS 2004-2006 combined years).



| | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|--------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Missouri (N) | 37,900 | 37,030 | 38,294 | 38,167 | 38,401 | 38,667 | 39,423 | 40,964 | 41,374 | 42,993 |
| Nation (N) | 1,199,049 | 1,307,687 | 1,301,847 | 1,235,686 | 1,217,626 | 1,254,683 | 1,505,016 | 1,630,186 | 1,641,264 | 1,842,970 |

Note: A scale of 0%-15% was used to show more detail. It is advised that the trends data in Missouri and the nation should not be compared directly since they had different distributions on race/ethnicity.

Out of the infants born in 2006 in the Missouri PedNSS, 9.1% had low birthweight. During the last 10 years, this rate has been relatively stable (Figure 4). There has been no noticeable movement in achieving the Healthy People 2010 Objective.



Note: A scale of 0%-20% was used to show more detail.

**Please note that there were only 98 American Indian/Alaskan Native infants in the 2006 Missouri PedNSS for the indicator of low birthweight. According to CDC's criteria, analysis is not conducted if the number of cases is < 100.

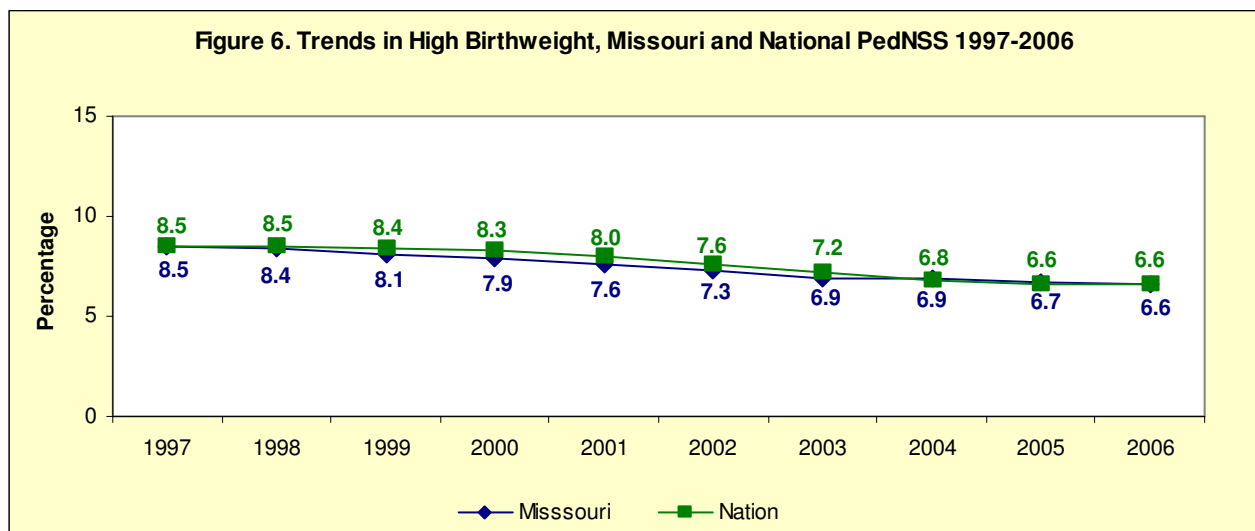
The percentage of low birthweight in the Missouri 2006 PedNSS varied by race and ethnicity. The prevalence was more than 2 times higher among Non-Hispanic Black infants (12.8%) than among

Hispanic infants (6.0%) (Figure 5). None of the racial and ethnic groups achieved the national goal of Healthy People 2010.

High Birthweight⁴

High birthweight (greater than 4,000 grams) increases the risk for infant death and birth injuries [5]. High birthweight may result in obesity in childhood that may extend into adult life [6]. Maternal prepregnancy overweight and greater than ideal maternal weight gain can be considered as strong predictors of high birthweight [7].

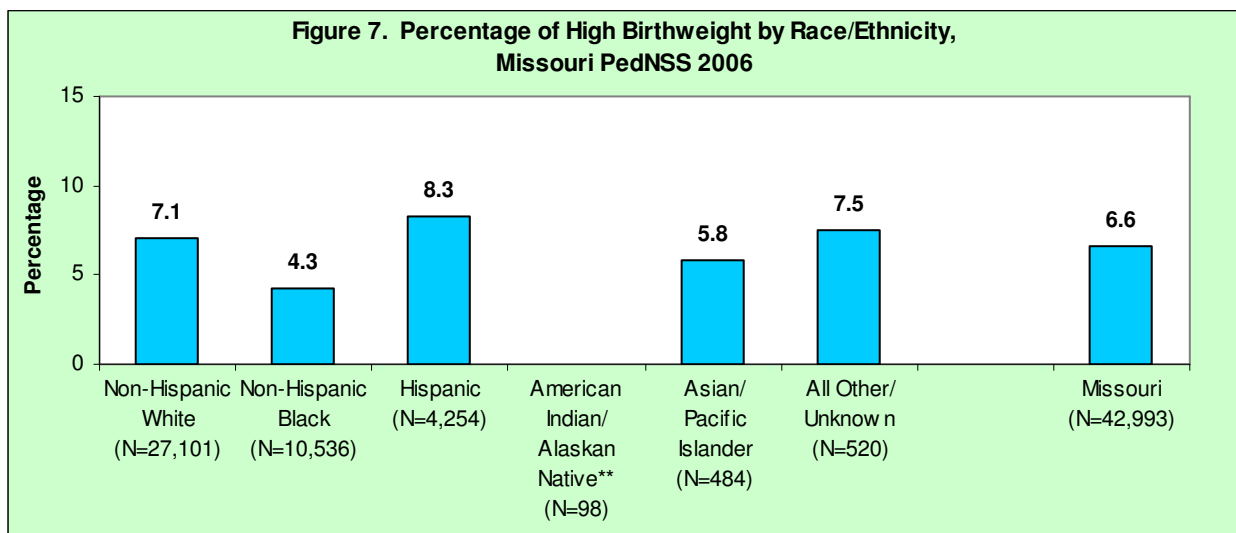
Out of the infants born in 2006 in Missouri PedNSS, 6.6% of infants were born overweight (Figure 6). During the last 10 years, this rate was highest in 1997 (8.5%) and lowest in 2006 (6.6%). Since 1997, the rate has been gradually decreasing, indicating that some progress has been made in the prevention of high birthweight.



| | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|--------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Missouri (N) | 37,900 | 37,030 | 38,294 | 38,167 | 38,401 | 38,667 | 39,423 | 40,964 | 41,374 | 42,993 |
| Nation (N) | 1,199,049 | 1,307,687 | 1,301,847 | 1,235,686 | 1,217,626 | 1,254,683 | 1,505,016 | 1,630,186 | 1,641,264 | 1,842,970 |

Note: A scale of 0%-15% was used to show more detail. It is advised that the trends data in Missouri and the nation should not be compared directly since they had different distributions on race/ethnicity.

⁴ Refer to the map in [Appendix 2](#) to see the prevalence of high birthweight by county (Missouri PedNSS 2004-2006 combined years).



Note: A scale of 0%-15% was used to show more detail.

**Please note that only 98 American Indian/Alaskan Native infants had high birthweight and the prevalence of this group was not calculated since the number of cases is less than 100.

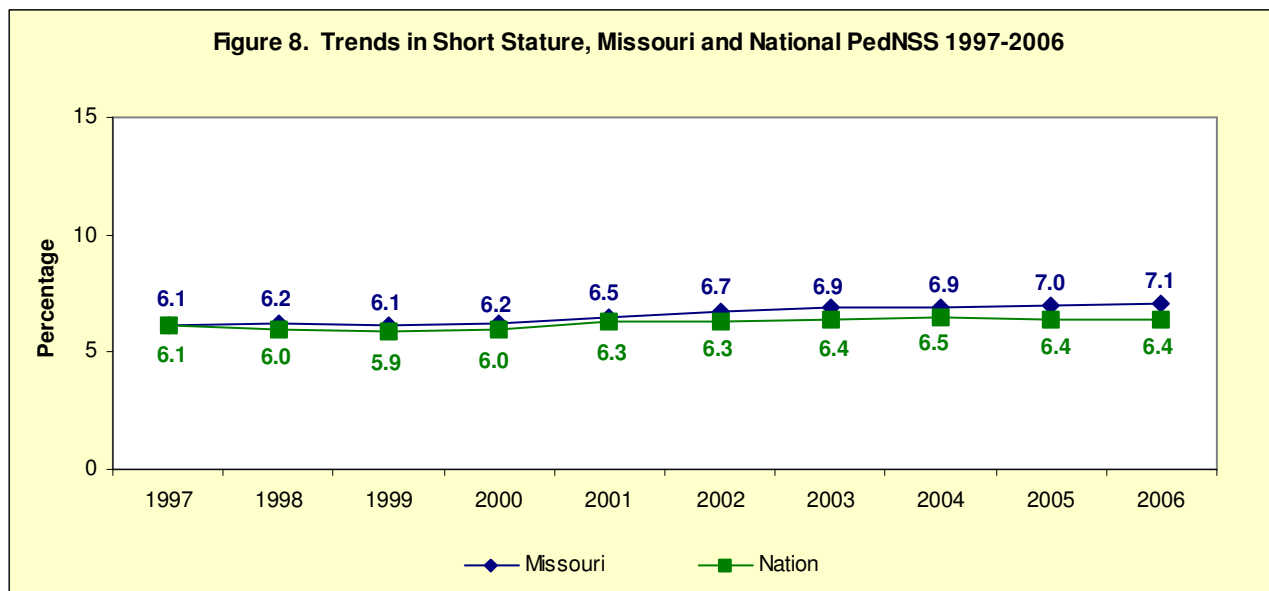
The prevalence of high birthweight varied by racial and ethnic group. It was highest in the Hispanic Native group (8.3%), and lowest in the Non-Hispanic Black group (4.3%).

Short Stature⁵

Short stature is defined as a length or stature less than the 5th percentile on the CDC age- and gender-specific length or stature reference (2000 CDC Growth Charts). Short stature, also referred to as low-length/height-for-age or stunting, is used as an indicator of chronic malnutrition. It reflects the long-term health and nutritional history of a child. A variety of health conditions (such as low birthweight) affect growth status and there are specialized charts that may be considered for use with children affected by these conditions. One of the Healthy People 2010 Objectives is to reduce growth retardation to 5% among children less than 5 years of age from low-income families.

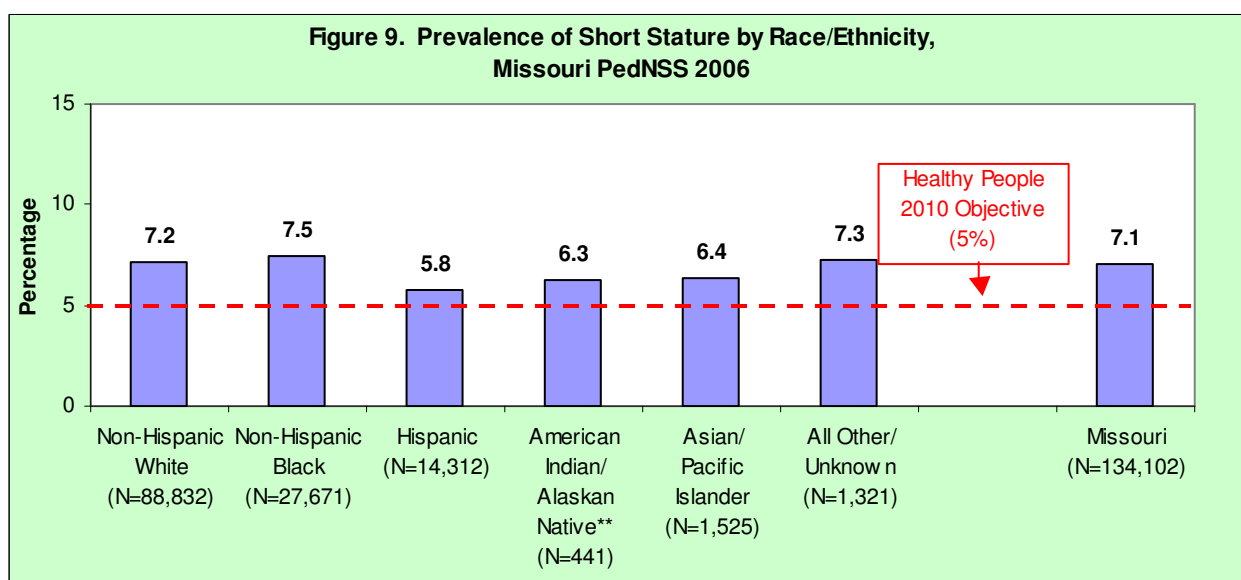
⁵ Refer to the map in [Appendix 3](#) to see the prevalence of short stature by county (Missouri PedNSS 2004-2006 combined years).

In Missouri PedNSS (children less than 5 years of age), the prevalence of short stature has been slightly increasing since 1999 (Figure 8). The lowest prevalence of 6.1% was in 1997 and 1999, and the highest prevalence of 7.1% was in 2006.



| | 1997 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2006 |
|--------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Missouri (N) | 143,520 | 137,692 | 137,431 | 132,100 | 130,470 | 128,690 | 131,869 | 136,603 | 134,600 | 134,102 |
| Nation (N) | 5,389,269 | 5,365,056 | 5,149,796 | 4,617,585 | 4,390,867 | 5,060,321 | 6,003,860 | 6,582,905 | 6,709,486 | 7,192,043 |

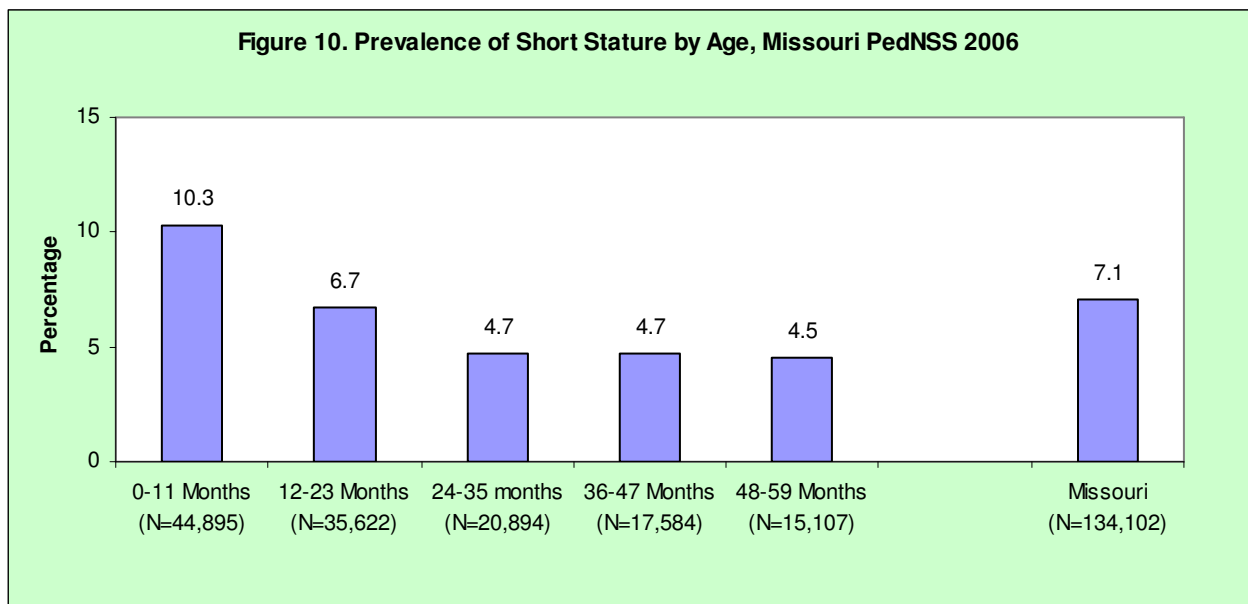
Note: A scale of 0%-15% was used to show more detail. It is advised that the trends data in Missouri and the nation should not be compared directly since they had different distributions on race/ethnicity.



Note: A scale of 0%-15% was used to show more detail.

**Please note that only 28 American Indian/Alaskan Native infants and children had short stature although the prevalence of this group was 6.3%.

The prevalence of short stature in Missouri PedNSS in 2006 was higher than the 2010 Healthy People Objective. In the 2006 Missouri PedNSS, Non-Hispanic Black infants and children had the highest prevalence (7.5%), while Hispanic infants and children had the lowest prevalence (5.8%).



Note: A scale of 0%-15% was used to show more detail.

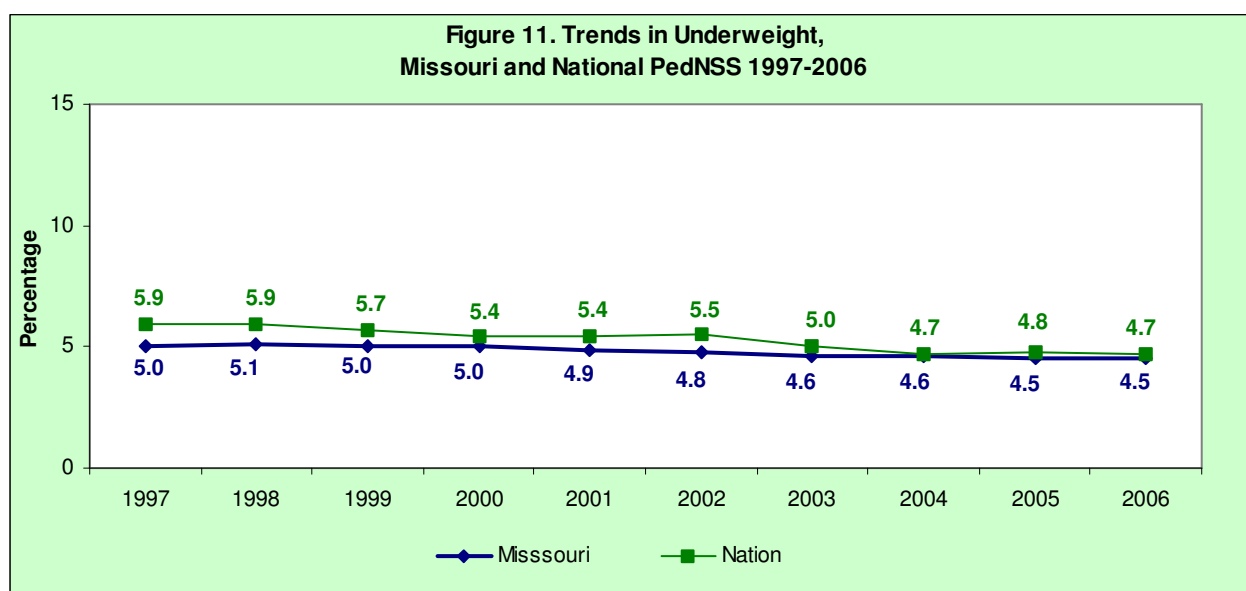
In the Missouri PedNSS 2006 population (infants and children less than 5 years of age), the prevalence of short stature decreased with the age of the participants (Figure 10). The age group of 0-11 months had the highest prevalence of short stature (10.3%), and the age group of 48-59 months had the lowest prevalence (4.5%).

Underweight⁶

Underweight in the PedNSS is based on the 2000 CDC gender-specific growth chart percentiles of less than the 5th percentile weight-for-length for children younger than 2 years of age and less than the 5th percentile BMI⁷-for-age for children age 2 years or older. Food shortages and disease outbreaks can result in high prevalence of underweight infants and children [8], so an underweight prevalence rate greater than 5% may indicate serious health and nutrition problems.

⁶ Refer to the map in [Appendix 4](#) to see the prevalence of underweight by county (Missouri PedNSS 2004-2006 combined years).

⁷ BMI, Body Mass Index, is a number calculated from a person's weight and height. Then formula is weight in kilograms divided by height in meters squared (kg/m²).

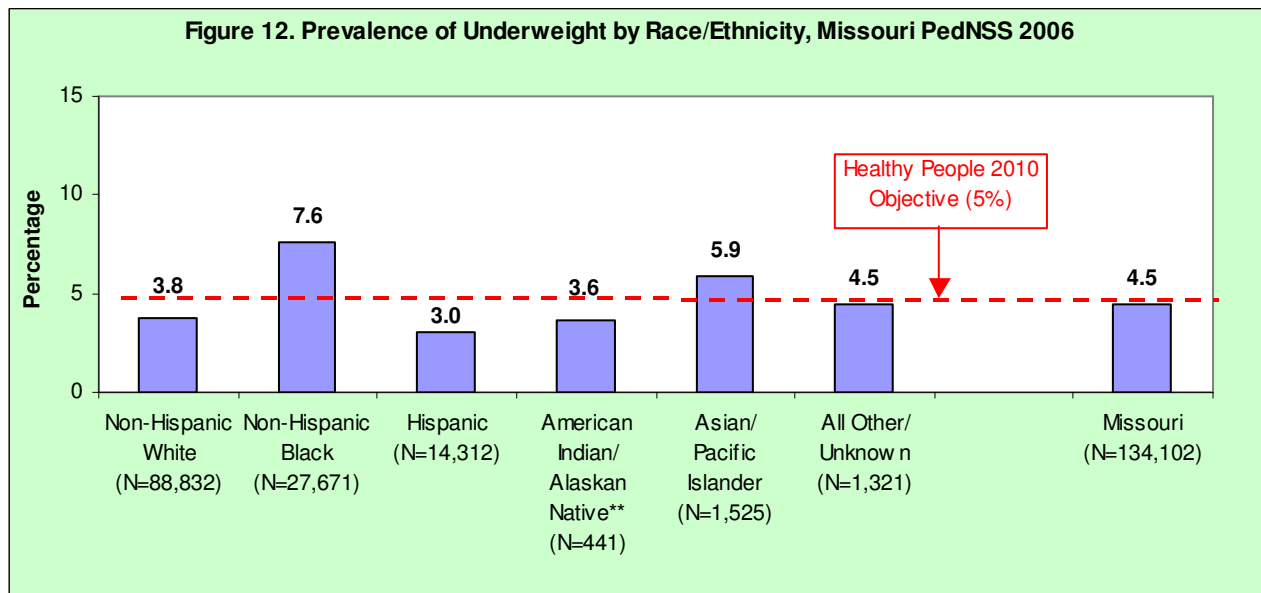


| | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|--------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Missouri (N) | 143,520 | 137,692 | 137,431 | 132,100 | 130,470 | 128,690 | 131,869 | 136,603 | 134,600 | 134,102 |
| Nation (N) | 5,389,269 | 5,365,056 | 5,149,796 | 4,617,585 | 4,390,867 | 5,060,321 | 6,003,860 | 6,582,905 | 6,709,486 | 7,192,043 |

Note: A scale of 0%-15% was used to show more detail. It is advised that the trends data in Missouri and the nation should not be compared directly since they had different distributions on race/ethnicity.

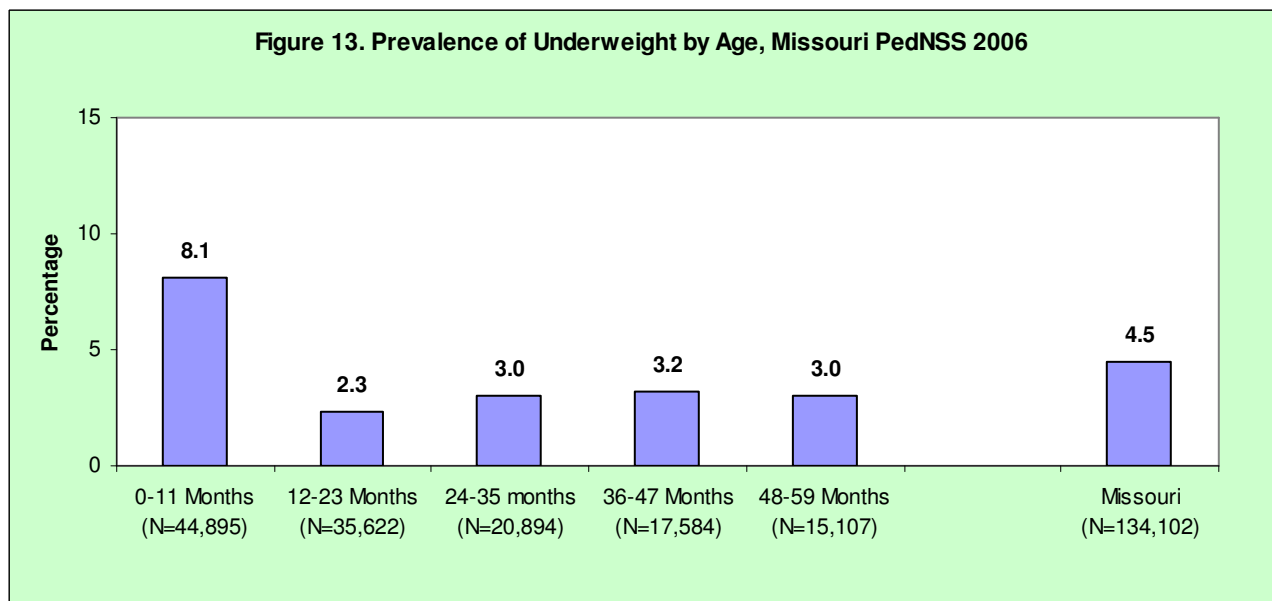
Over the last 10 years, the prevalence of underweight in the Missouri PedNSS (infants and children less than 5 years of age) has decreased from 5.0% in 1997 to 4.5% in 2006 (Figure 11). Overall, the 2006 rate indicated that acute malnutrition was not a public health problem in the Missouri PedNSS population, because the prevalence of underweight children under 5 years of age in 2006 (4.5%) was lower than the Healthy People 2010 Objective of 5.0%.

The higher prevalence of underweight in the Missouri PedNSS 2006 occurred among Non-Hispanic Black children (7.6%) and Asia/Pacific Islander children (5.9%) (Figure 12). However, the percentages of underweight children in the Non-Hispanic White, Hispanic, and American Indian/Alaskan Native groups were lower than the Healthy People 2010 Objective of 5%.



Note: A scale of 0%-15% was used to show more detail.

**Please note that only 16 American Indian/Alaskan Native infants and children were underweight although the prevalence of this group was 3.6%.

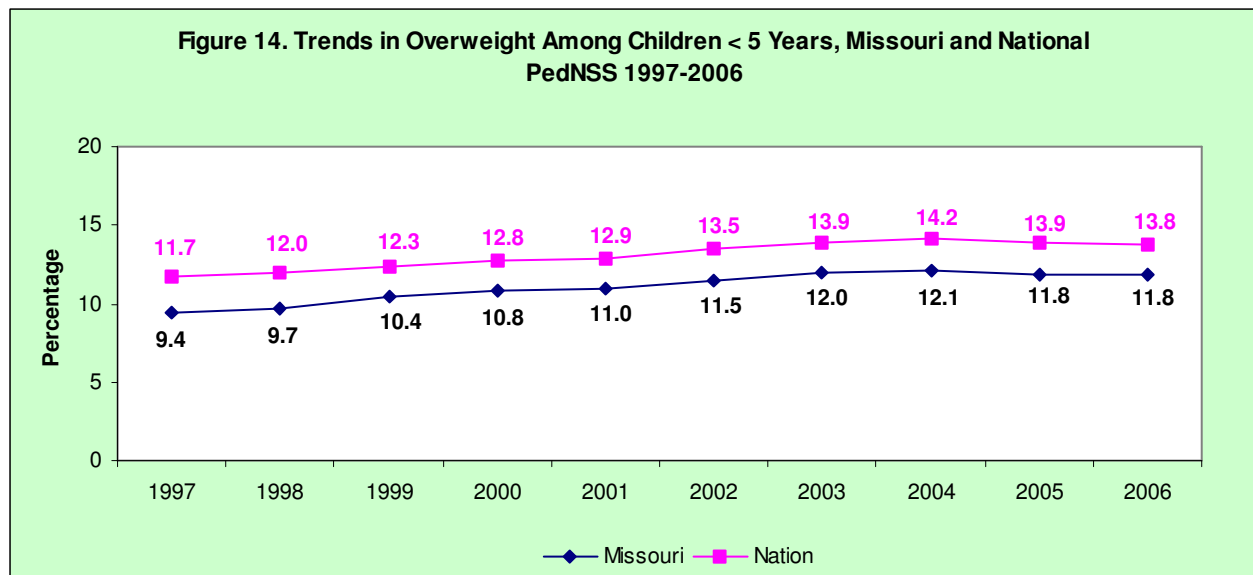


Note: A scale of 0%-15% was used to show more detail.

Infants (0-11 months old) were at higher risk of being underweight in the Missouri PedNSS population in year 2006 (8.1%) compared to the other age groups.

Overweight (Birth to 5 Years of Age)⁸

The prevalence of childhood and adolescent overweight has tripled over the past two decades. Associations have been identified between dietary patterns, physical activity, sedentary behaviors, and overweight [9]. In the PedNSS, overweight is based on the 2000 CDC growth chart percentiles of greater than or equal to the 95th percentile weight-for-length for children less than 2 years of age and greater than or equal to the 95th percentile BMI-for-age for children 2 years of age or older.

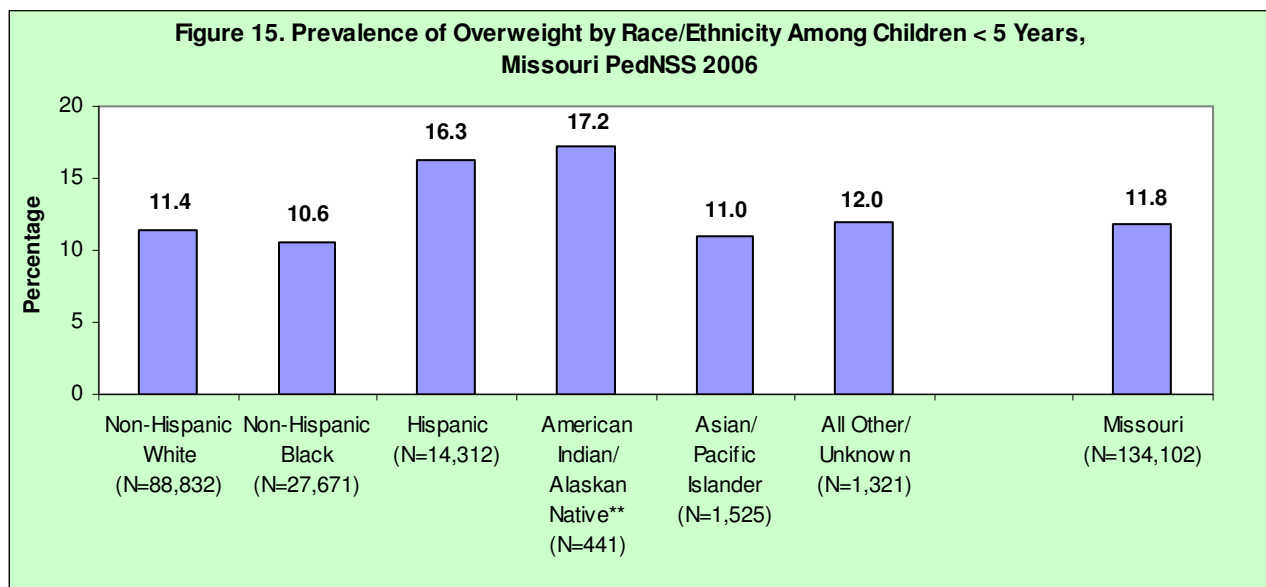


| | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|--------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Missouri (N) | 143,520 | 137,692 | 137,431 | 132,100 | 130,470 | 128,690 | 131,869 | 136,603 | 134,600 | 134,102 |
| Nation (N) | 5,389,269 | 5,365,056 | 5,149,796 | 4,617,585 | 4,390,867 | 5,060,321 | 6,003,860 | 6,582,905 | 6,709,486 | 7,192,043 |

Note: A scale of 0%-20% was used to show more detail. It is advised that the trends data in Missouri and the nation should not be compared directly since they had different distributions on race/ethnicity.

In the Missouri PedNSS 2006, during the last 10 years, the proportion of overweight in children from birth to age 5 years has been increasing from 9.4% in 1997 to 12.1% in 2004 (Figure 14). However, since 2005, the overweight rates for both Missouri and the nation slightly declined.

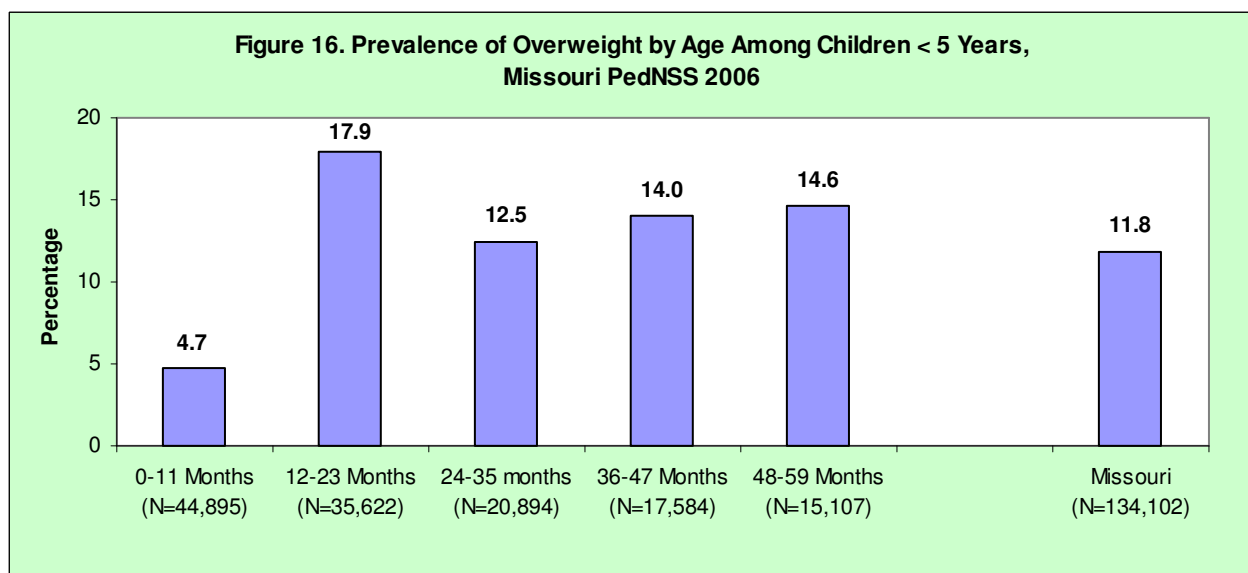
⁸ Refer to the map in [Appendix 5](#) to see the prevalence of overweight (birth to 5 years of age) by county (Missouri PedNSS 2004-2006 combined years).



Note: A scale of 0%-20% was used to show more detail.

**Please note that only 76 American Indian/Alaskan Native infants were overweight although the prevalence of this group was 17.2%.

The highest prevalence of overweight in the Missouri PedNSS 2006 occurred among American Indian/Alaskan Native children (17.2%) (Figure 15). But more significant is that the Hispanic infants and children had a high prevalence of overweight (16.3%). The percentage of Non-Hispanic Black (10.6%) children being overweight was the lowest.

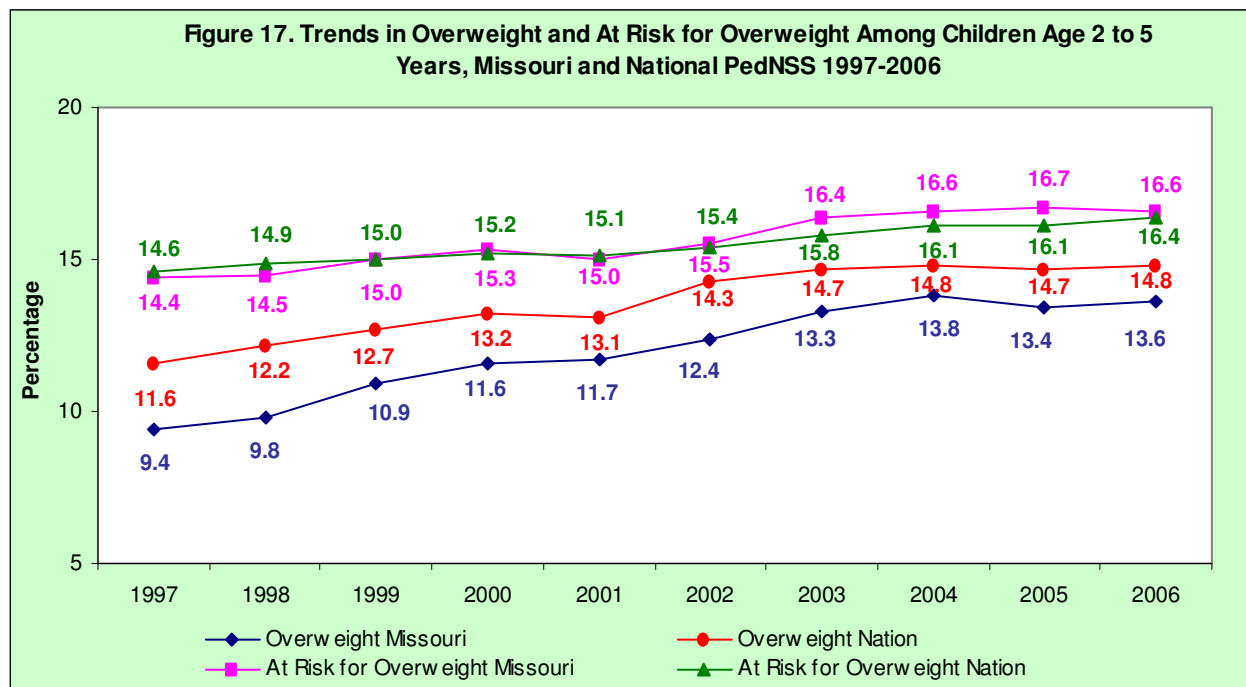


Note: A scale of 0%-20% was used to show more detail.

From the perspective of age groups, the highest prevalence of overweight (17.9%) in the Missouri PedNSS 2006 was in the 12-23 months group, and lowest prevalence (4.7%) was in the 0-11 months group (Figure 16).

Overweight and At Risk for Overweight (2 to 5 Years of Age)⁹

Overweight in children younger than 2 years old does not cause the same risk as for children age 2 or older. A weak association has been found between the 2 years or older group's weight and an increased risk for adult obesity [10]. The Expert Committee on Clinical Guidelines for Overweight in Adolescent Preventive Services recommended a two-level screening for overweight in children age 2 years or older. The suggestion was to use BMI-for-age at or above the 95th percentile to define overweight and between the 85th and 95th percentile to define at risk for overweight [11].

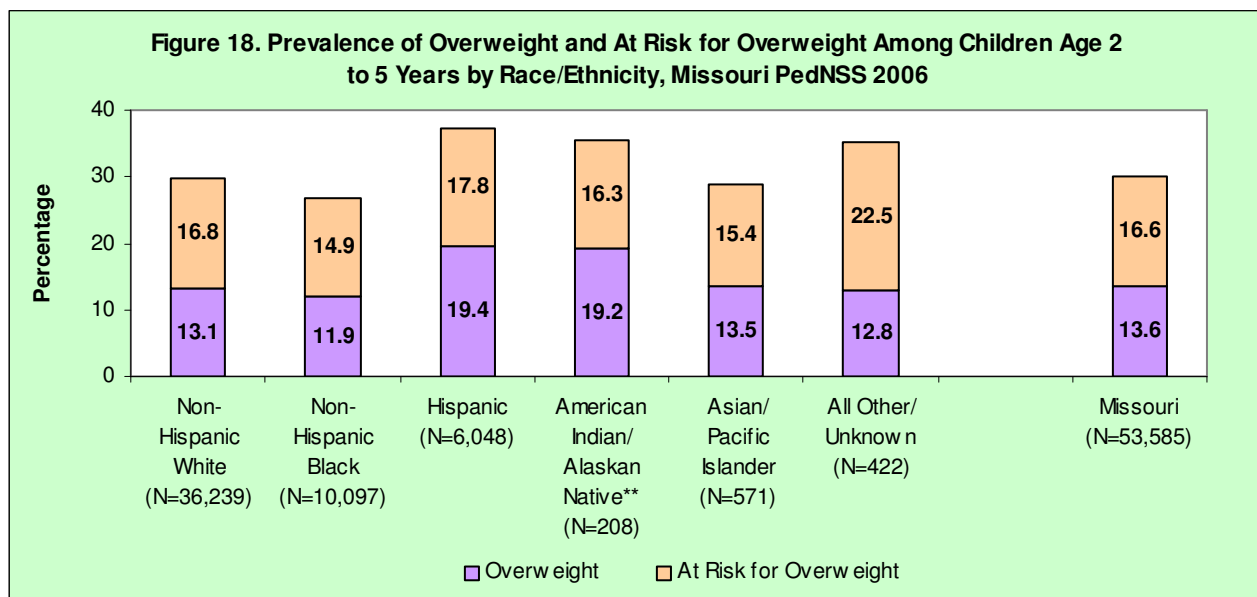


| | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|--------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Missouri (N) | 61,820 | 58,000 | 56,711 | 53,548 | 54,672 | 53,243 | 56,346 | 57,587 | 55,167 | 53,585 |
| Nation (N) | 2,396,884 | 2,320,924 | 2,187,151 | 1,932,131 | 1,814,873 | 2,139,100 | 2,576,591 | 2,814,475 | 2,869,075 | 2,945,212 |

Note: A scale of 5%-20% was used to show more detail. It is advised that the trends data in Missouri and the nation should not be compared directly since they had different distributions on race/ethnicity.

Over the last 10 years, the rate of overweight among Missouri's PedNSS children, age 2 to 5 years increased from 9.4% in 1997 to 13.8% in 2004. It decreased for the first time to 13.4% in 2005, but increased to 13.6% in 2006 (Figure 17). The rate of at risk for overweight for this group of children has increased from 14.4% in 1997 to 16.7% in 2005. It decreased to 16.6% in 2006.

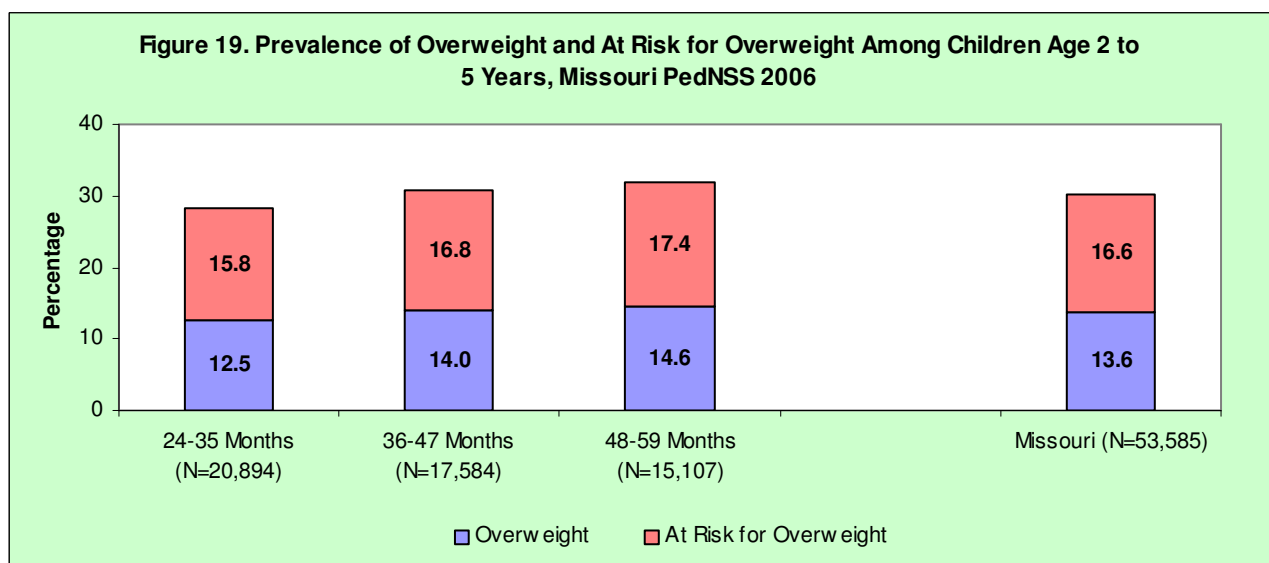
⁹ Refer to the maps in [Appendix 6](#) and [Appendix 7](#) to see the rates of overweight and at risk for overweight (2-5 years of age) by county (Missouri PedNSS 2004-2006 combined years).



Note: A scale of 0%-40% was used to show more detail.

** Please note that only 40 American Indian/Alaskan Native children were overweight and 34 American Indian/Alaskan Native children were at risk for overweight although the rates of both categories were relatively high compared to most of the race/ethnicity groups.

In the Missouri PedNSS 2006, the highest rates of overweight (19.4%) and at risk for overweight (17.8%) were among Hispanic children (Figure 18). Compared to all other racial and ethnic groups, Non-Hispanic Black children age 2 to 5 years were the least likely to be overweight (11.9%) and at risk for overweight (14.9%).



Note: A scale of 0%-40% was used to show more detail.

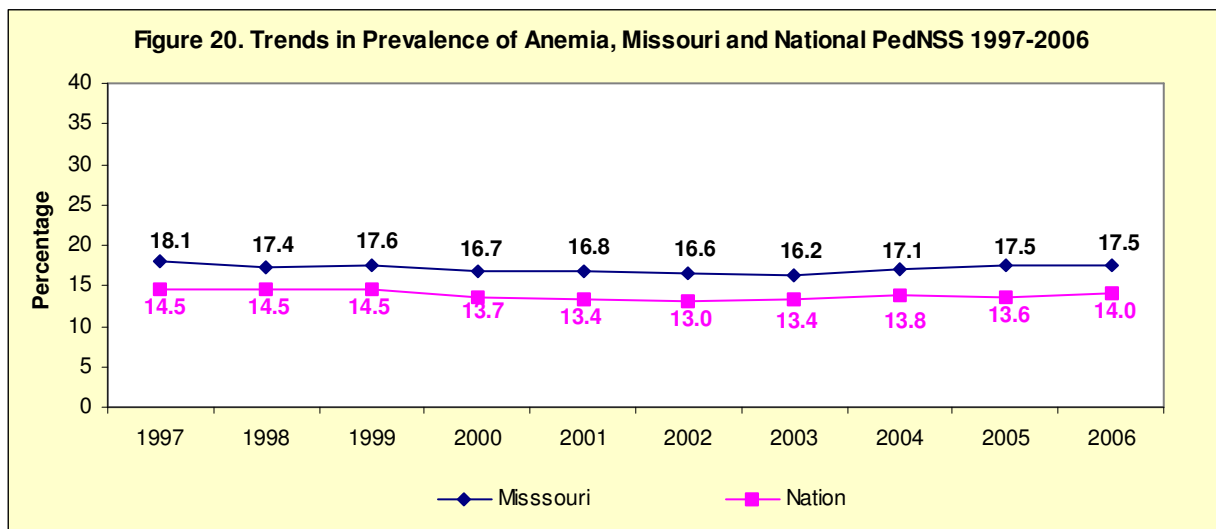
The proportion of overweight children increased with age in the Missouri PedNSS 2006 (Figure 19). In the age group 24-35 months, 12.5% of the children were overweight; in the age group 36-47 months, 14.0% of the children were overweight; and in the age group 48-59 months, 14.6% of the children were overweight. The proportion of at risk for overweight children increased with age, too.

Respectively, 15.8%, 16.8%, and 17.4% in age groups 24-35 months, 36-47 months, and 48-59 months, were overweight.

Anemia (Low Hemoglobin/Hematocrit)¹⁰

Anemia in the PedNSS refers to a hemoglobin or hematocrit level lower than the age-adjusted reference range for healthy children¹¹. Anemia is the most common indicator of nutrient (iron) deficiency in the world [12]. Iron deficiency in children is associated with long-lasting diminished mental, motor and behavioral functioning [13]. Racial differences apparently exist, with Non-Hispanic Black children having lower normal values than Non-Hispanic White and Asian/Pacific Islander children of the same age and socioeconomic background [14]. The Healthy People 2010 Objective is to reduce anemia among children age 1 to 2 years to 5% and children age 3 to 4 years to 1%¹².

In Missouri PedNSS 2006, the prevalence of anemia (infants and children 6 months of age and older included in analysis)¹³ declined since 1997 (Figure 20). It reached the lowest point of 16.2% in 2003, but increased to 17.5% in 2006.



| | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|--------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Missouri (N) | 113,552 | 106,836 | 106,770 | 95,373 | 86,454 | 85,831 | 86,726 | 89,598 | 86,931 | 85,027 |
| Nation (N) | 3,925,299 | 3,864,299 | 3,645,746 | 3,217,568 | 3,116,606 | 3,421,187 | 3,600,353 | 4,364,901 | 4,381,087 | 4,521,591 |

Note: A scale of 0%-40% was used to show more detail. It is advised that the trends data in Missouri and the nation should not be compared directly since they had different distributions on race/ethnicity.

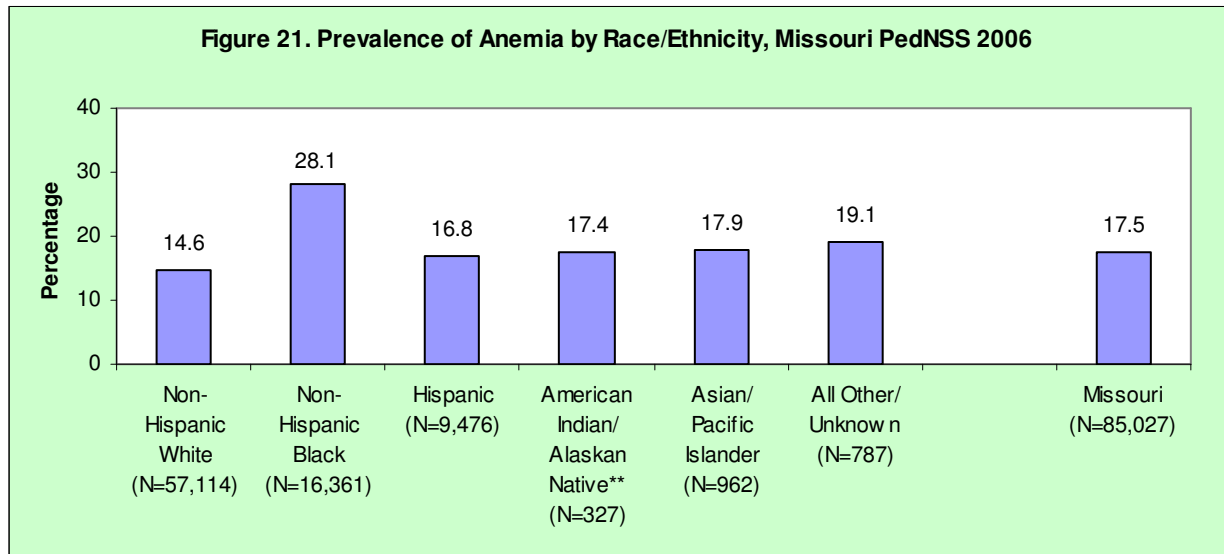
¹⁰ Refer to the map in [Appendix 8](#) to see the prevalence of anemia by county (Missouri PedNSS 2004-2006 combined years).

¹¹ In PedNSS, children age 1 to 2 years are considered anemic if their hemoglobin concentration is less than 11.0 g/dL or their hematocrit level is less than 33.0%. Children age 2-5 years are considered anemic if their hemoglobin concentration is less than 11.1 g/dL or their hematocrit level is less than 33.3%.

¹² In PedNSS, age groups are 6-11 months, 12-17 months, 18-23 months, 24-35 months, and 36-59 months. Therefore, this classification does not allow comparing low hemoglobin/hematocrit rates directly between PedNSS and the Healthy People 2010 objective.

¹³ For this indicator, infants less than 6 months of age were not included in analysis.

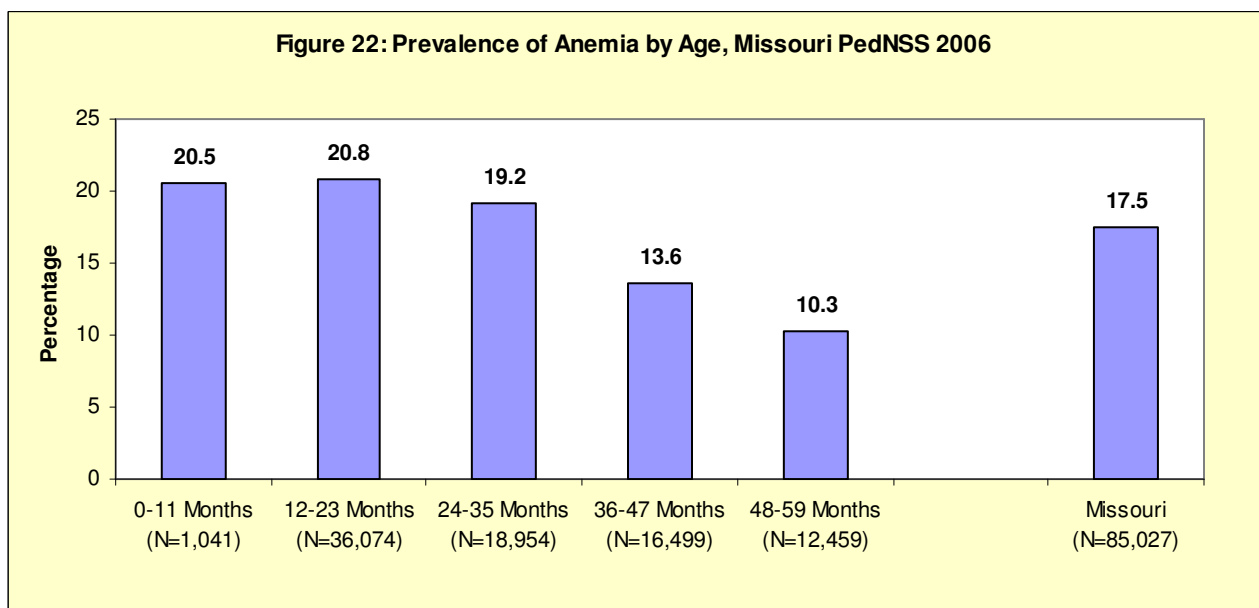
The proportion of infants and children with anemia (low hemoglobin/hematocrit) in the Missouri PedNSS 2006 varied in different racial and ethnic groups. The highest proportion of participants with low hemoglobin/hematocrit was in the Non-Hispanic Black Missouri PedNSS population (28.1%) (Figure 21). The lowest prevalence of anemia was in the Non-Hispanic White group (14.6%).



Note: A scale 0%-40% was used to show more detail.

**Please note that only 57 American Indian/Alaskan Native infants and children were anemic although the prevalence of this group was 17.4%.

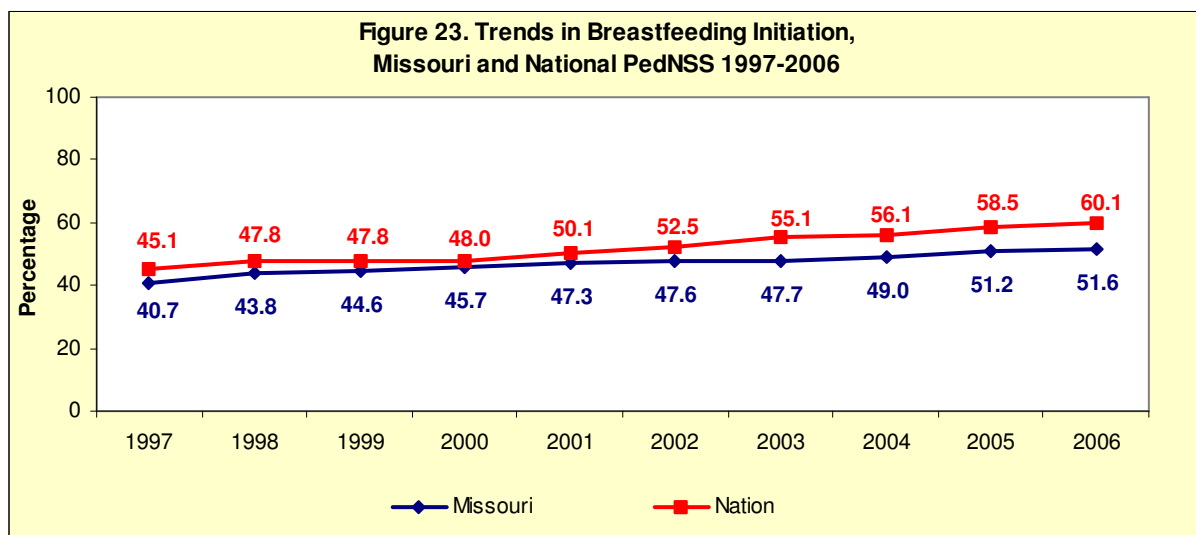
The highest prevalence of anemia (21.3%) in the Missouri PedNSS in 2005 occurred in infants 0-11 months old (Figure 22). In general, the rate decreased as the children became older.



Note: A scale 0%-25% was used to show more detail.

Breastfeeding Initiation¹⁴

The health and economic benefits of breastfeeding are well documented. According to the American Academy of Pediatrics (AAP), human milk is “uniquely suited” for human infants [15]. With rare exceptions, human milk provides the most complete form of nutrition for infants, including premature and sick newborns [16]. Accordingly, the AAP recommends that infants be breastfed exclusively for the first six months after birth and that breastfeeding continue through the entire first year of life. Breastfeeding after the first 12 months should continue as long as mutually desired. When direct breastfeeding is not possible, expressed breast milk, fortified when necessary for the premature infant, should be provided [17].



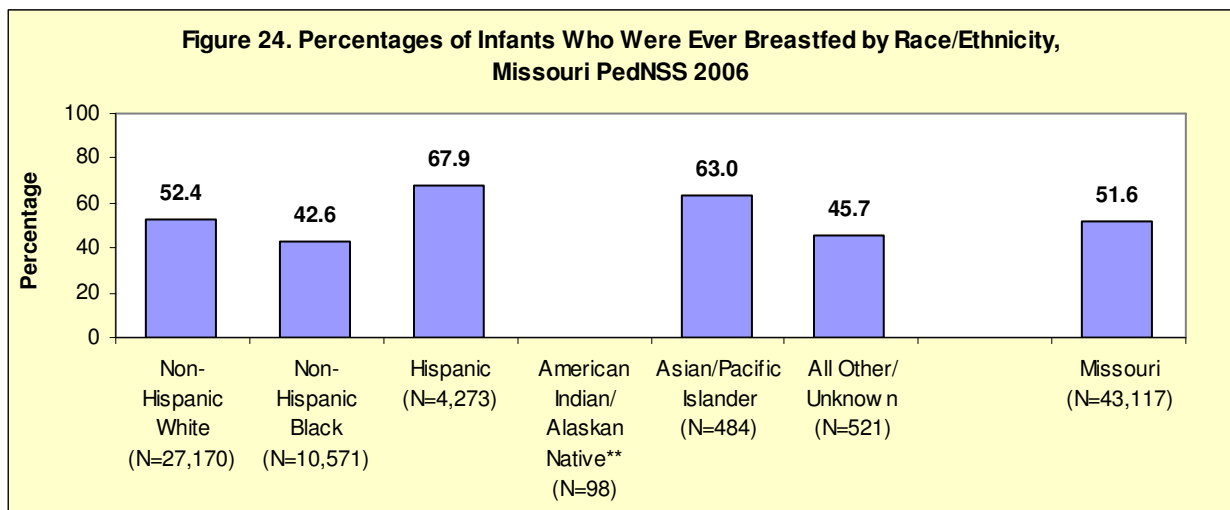
| | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 |
|--------------|---------|---------|---------|---------|---------|-----------|-----------|-----------|-----------|-----------|
| Missouri (N) | 38,037 | 37,189 | 38,516 | 38,345 | 38,582 | 37,823 | 38,757 | 40,666 | 41,514 | 43,117 |
| Nation (N) | 750,078 | 877,246 | 864,433 | 905,154 | 553,594 | 1,014,091 | 1,244,877 | 1,466,352 | 1,515,954 | 1,577,832 |

Note: It is advised that the trends data in Missouri and the nation should not be compared directly since they had different distributions on race/ethnicity.

In the PedNSS, breastfeeding initiation is determined by ever breastfed. The overall rate of breastfeeding initiation among infants in the Missouri PedNSS has been increasing over the last 10 years from 40.7% in 1997 to 51.6% in 2006 (Figure 23). The Healthy People 2010 Objective in breastfeeding initiation (75%) was far from being achieved in the Missouri WIC population in 2006.

¹⁴ Refer to the map in [Appendix 9](#) to see the percentage of infants ever breastfed by county (Missouri PedNSS 2004-2006 combined years).

Hispanic babies were more likely to be ever breastfed than infants in all other racial and ethnic groups in the Missouri PedNSS 2006 (67.9%) (Figure 24). The Non-Hispanic Black infants were the least likely to be ever breastfed in 2006 (42.6%).



** Please note that the percentage of American Indian/Alaskan Native infants who were ever breastfed was not calculated since the number of cases was less than 100.

CONCLUSIONS AND RECOMMENDATIONS

An important use of the PedNSS data is to compare the status of certain indicators in Missouri with the Healthy People 2010 Objectives that were developed for the nation. These objectives were designed to serve as a goal for monitoring progress towards improving the health of the nation.

| Table 1: Monitoring Healthy People 2010 Objectives Using Missouri PedNSS Trends 1997-2006 and Comparing Missouri and National PedNSS Data on Selected Health and Behavioral Indicators | | | | |
|--|--|---|---------------------------|--------------------------------------|
| Indicator | Healthy People 2010 Objectives Monitored by PedNSS* | Trend of the Missouri PedNSS 1997-2006 | National PedNSS Rate 2006 | Missouri PedNSS Adjusted Rate 2006** |
| Low Birthweight | Decrease low birthweight to 5% (16-10b) | Stable | 9.2 | 7.9 |
| Short Stature Underweight | Reduce growth retardation among low-income children under 5 years of age to 5% (19-4) | Slight increase since 1999 Decrease since 1997 | 6.4 | 6.5 |
| | Short Stature Underweight | | 4.7 | 4.2 |
| Breastfeeding Initiation | Increase the proportion of mothers who breastfeed in the early postpartum period to 75% (16-19a) | Increase since 1997 | 60.1 | 55.9 |
| Breastfed At Least 6 Months | Increase the proportion of mothers who breastfeed at 6 months to 50 % (16-19b) | | 25.2 | 25.8*** |
| Breastfed At Least 12 Months | Increase the proportion of mothers who breastfeed at 12 months to 25% (16-19c) | | 18.1 | 22.5*** |

* Healthy People 2010 Objectives on web: <http://www.healthypeople.gov>.

** Adjusted rates according to CDC's procedure.

*** Previous procedures for breastfeeding duration data collection did not capture adequate data to measure duration. However, the procedures were modified in 2006 to allow for collecting more reliable data since 2006 for the measurement of breastfeeding duration.

The 10-year trend data (from 1997 to 2006) showed some improvements in decreasing the proportion of underweight infants and children in the WIC population. Additionally, progress has been made in breastfeeding initiation. However, the Healthy People 2010 Objectives pertaining to reduction of the percentage of low birthweight and growth retardation (short stature) have not shown advances (Table 1).

Compared with the national PedNSS data as shown in Table 1, the percentage of low birth weight babies and the percentage of underweight babies in Missouri PedNSS 2006 were lower than the national average levels. Missouri had almost the same rate on the indicator of short stature as that in the national PedNSS in this year. However, the breastfeeding initiation rate in Missouri PedNSS 2006 was lower than the national average level.¹⁵

The PedNSS data summary indicates the need for the following actions:

- Prevent low birthweight by providing preconception nutrition care and outreach activities to promote early identification of pregnancy and early entry into comprehensive prenatal care, including medical care and WIC program services.
- Identify children with short stature and appropriately monitor to assure that they receive adequate nutrients to promote optimal growth, and that there are no other health problems limiting growth.
- Implement innovative strategies to reverse the rising trend of overweight in young children by increasing breastfeeding, increasing physical activity, promoting increased consumption of fruits and vegetables, and decreasing sedentary time. Routinely screen for overweight and at risk for overweight using BMI-for-age recommended by the American Academy of Pediatrics Policy Statement [18].
- Conduct hemoglobin/hematocrit screening to identify all infants and children at highest risk of having iron deficiency anemia, develop and implement effective intervention strategies, including nutrition education focused on iron rich foods and iron absorption-enhancing foods and provide follow-up to improve iron nutrition status.
- Promote and support breastfeeding through medical care systems, work sites and communities.

¹⁵ The proportions of racial and ethnic indicators in the national 2006 PedNSS were different from those in the Missouri 2006 PedNSS. Therefore, to make the Missouri PedNSS population comparable on indicators of interest to the Nation, a standardization procedure was applied to Missouri's PedNSS data when a comparison occurs. The procedure is available on CDC's website: http://www.cdc.gov/pednss/how_to/interpret_data/what/example.htm

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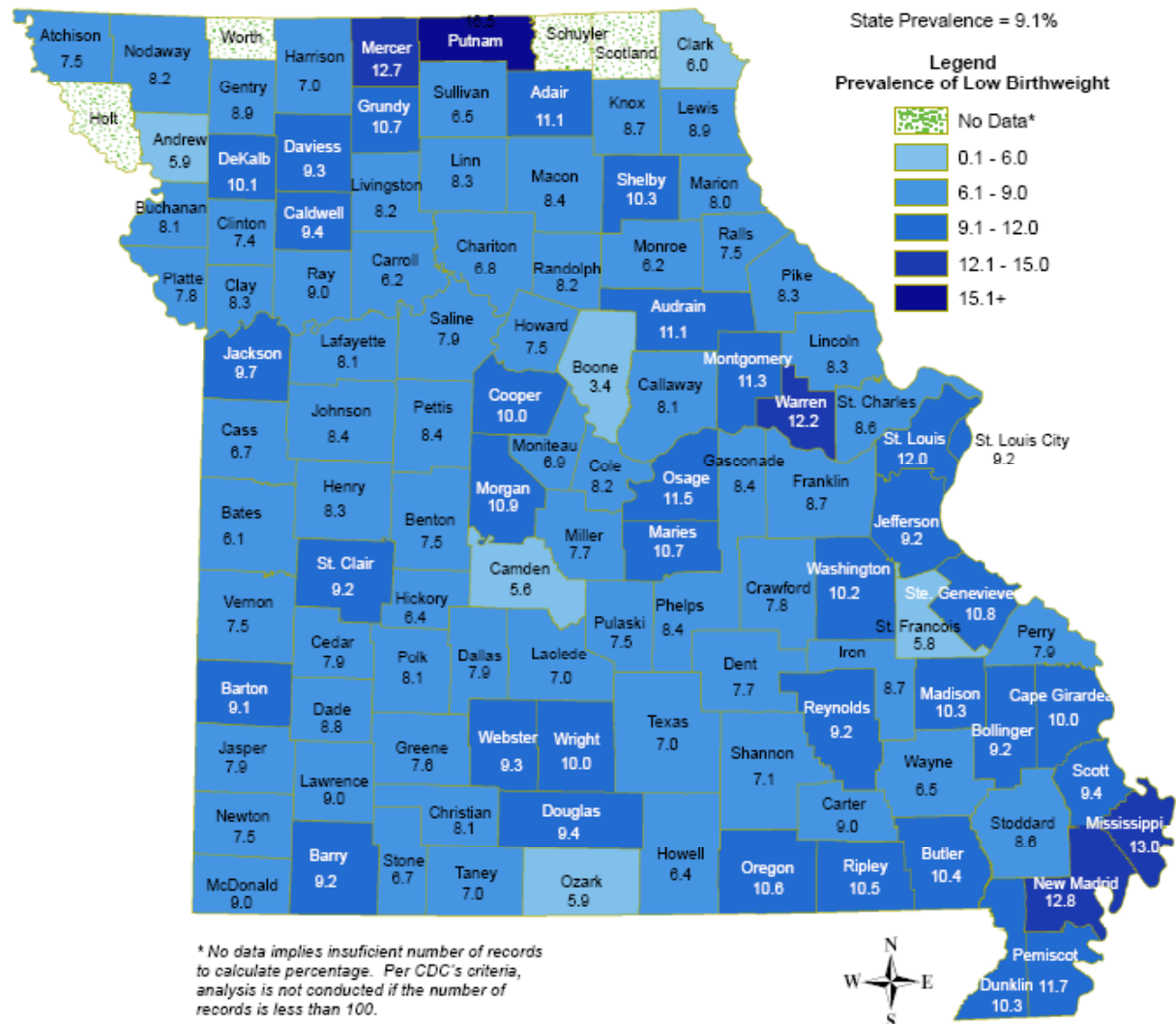
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APPENDICES

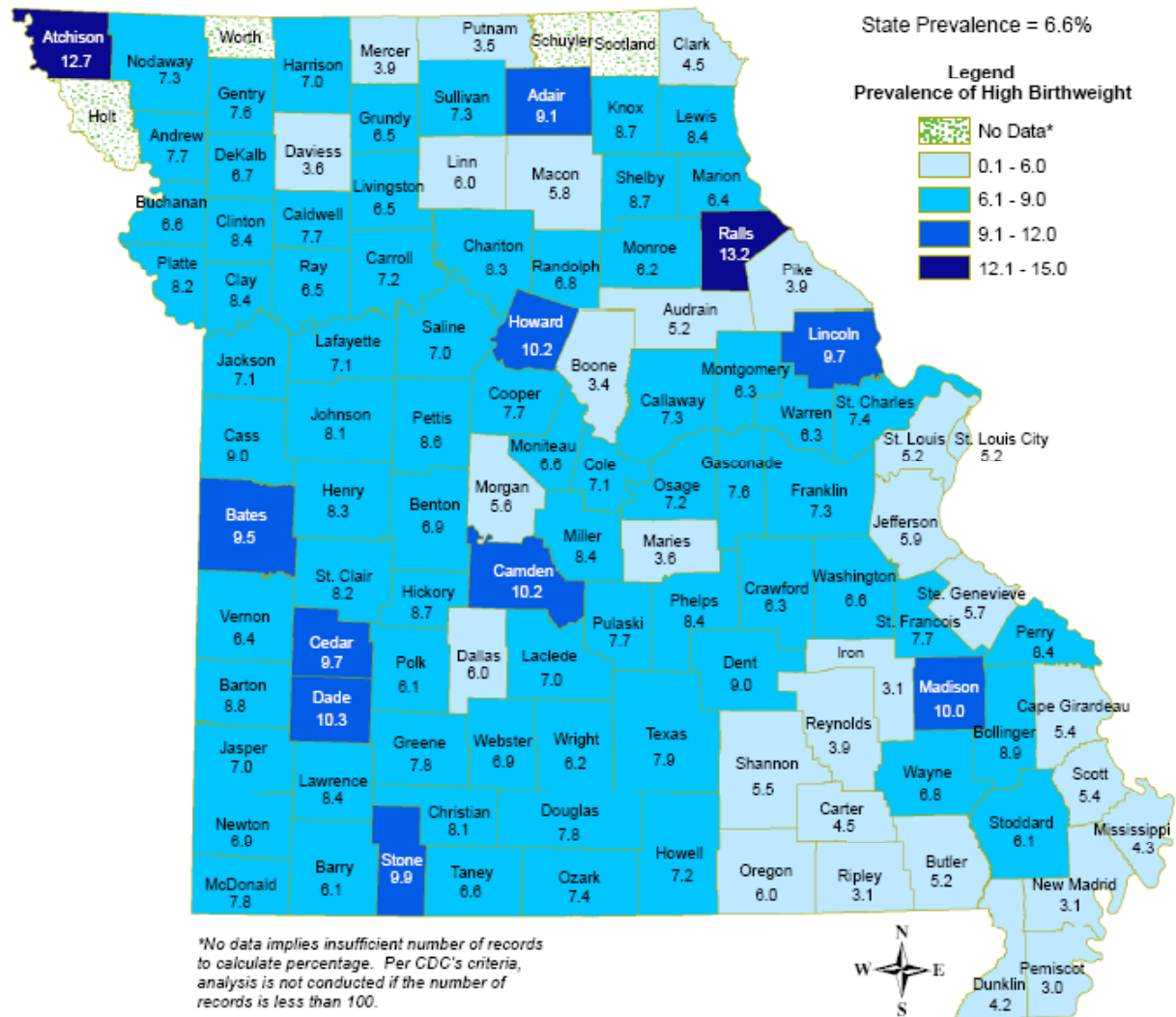
Appendix 1

**Prevalence of Low Birthweight by County,
Missouri PedNSS 2004-2006 Combined Years**



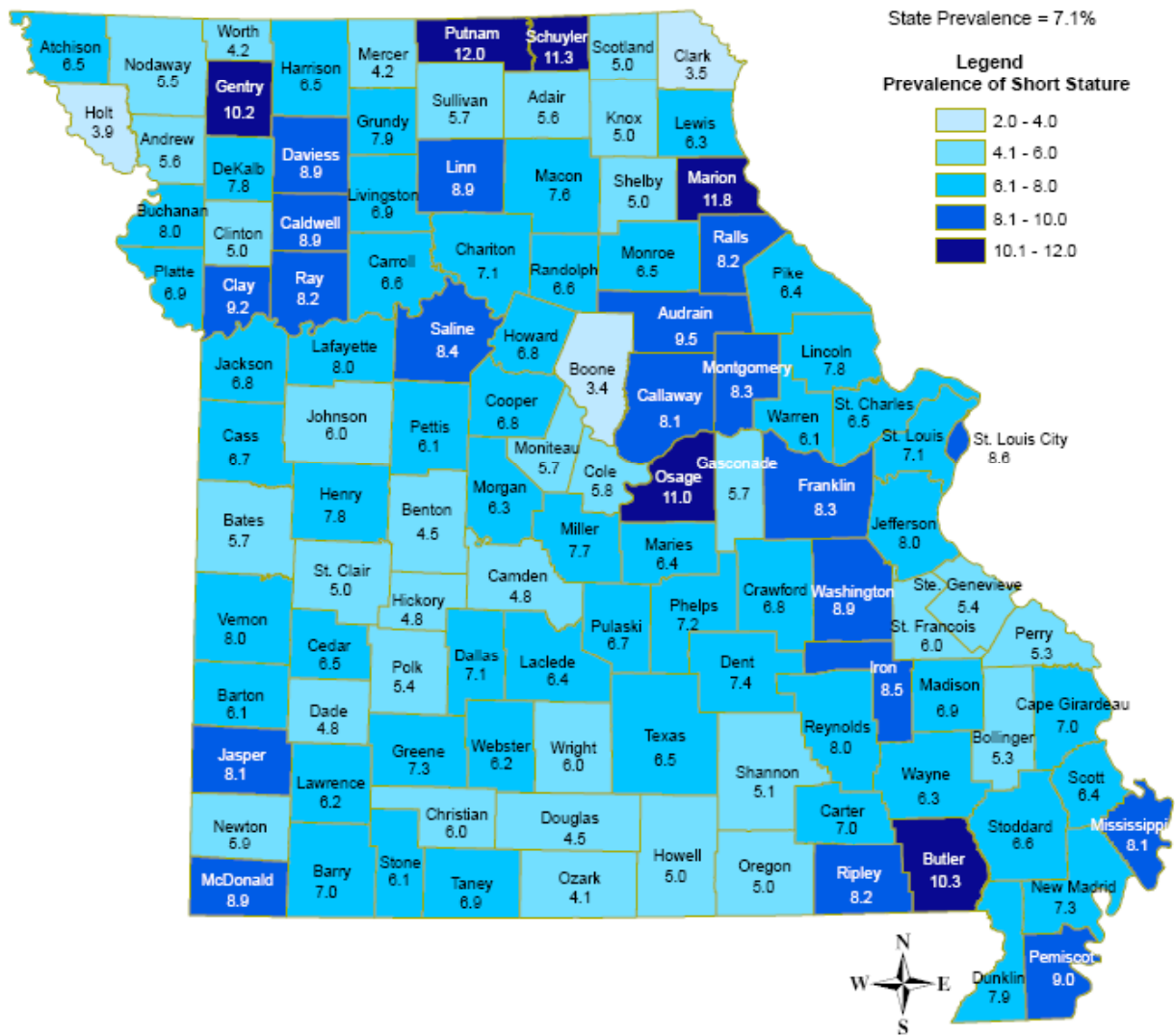
Appendix 2

Prevalence of High Birthweight by County, Missouri PedNSS 2004-2006 Combined Years



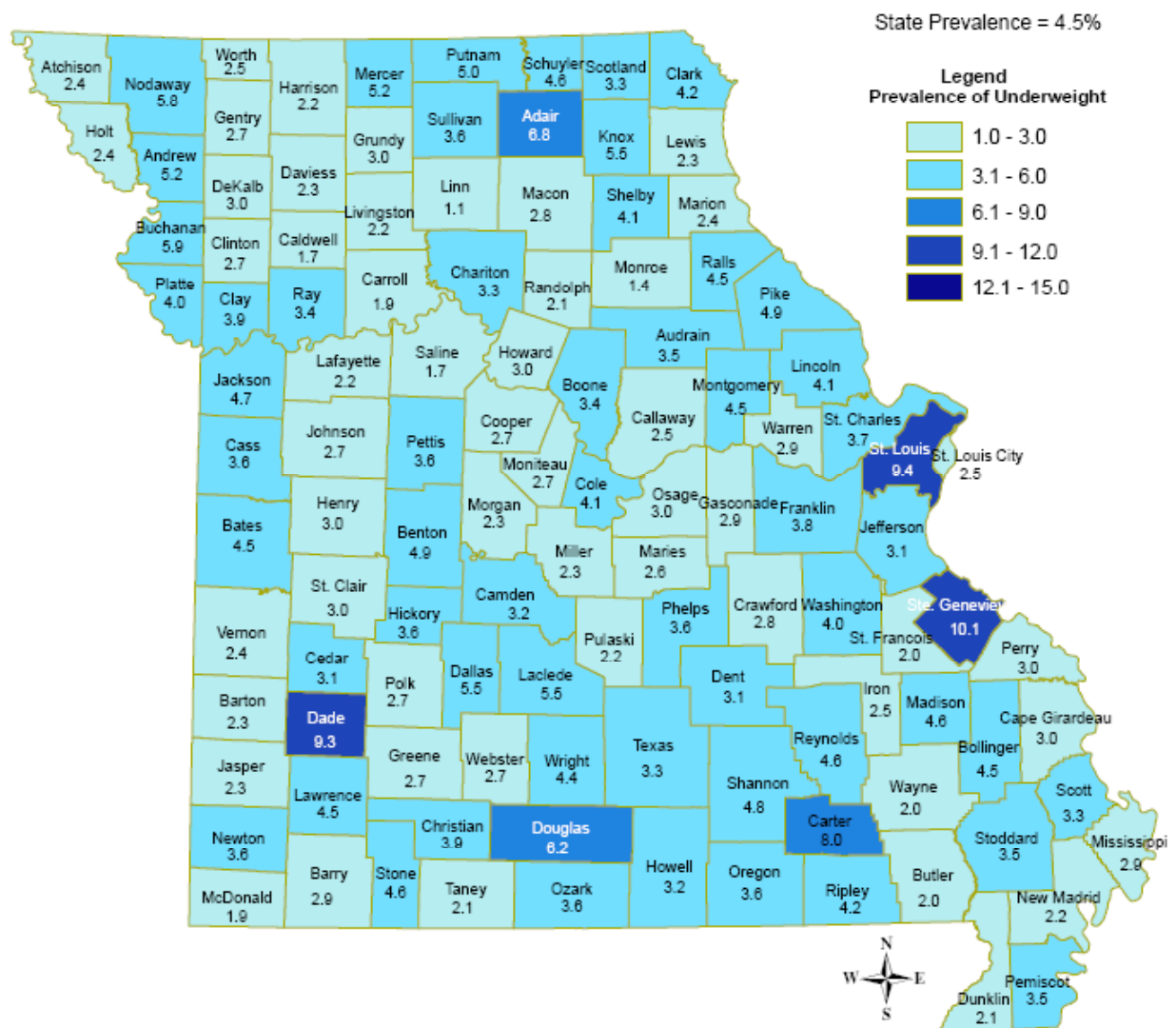
Appendix 3

**Prevalence of Short Stature by County,
Missouri PedNSS 2004-2006 Combined Years**



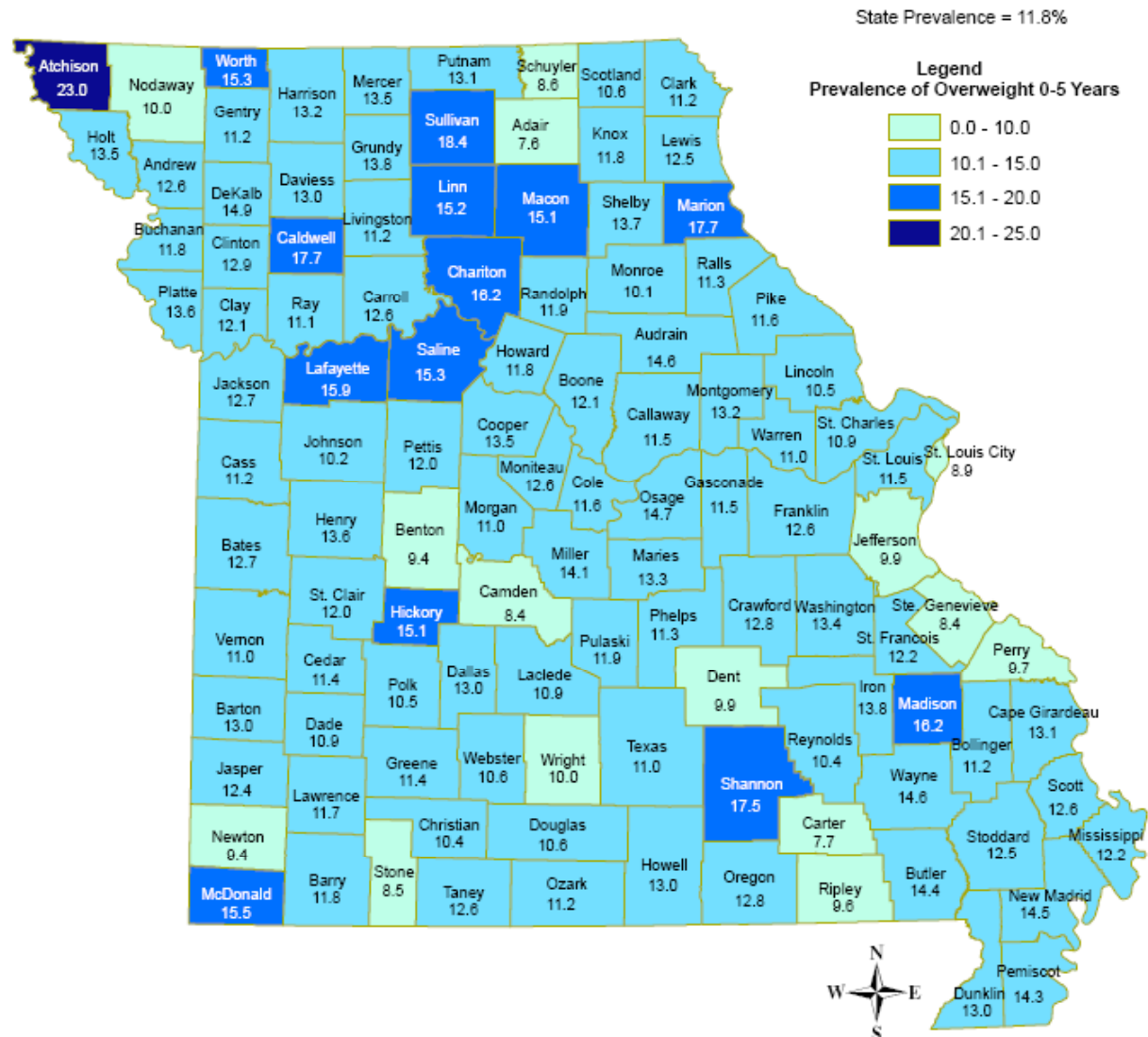
Appendix 4

Prevalence of Underweight by County, Missouri PedNSS 2004-2006 Combined Years



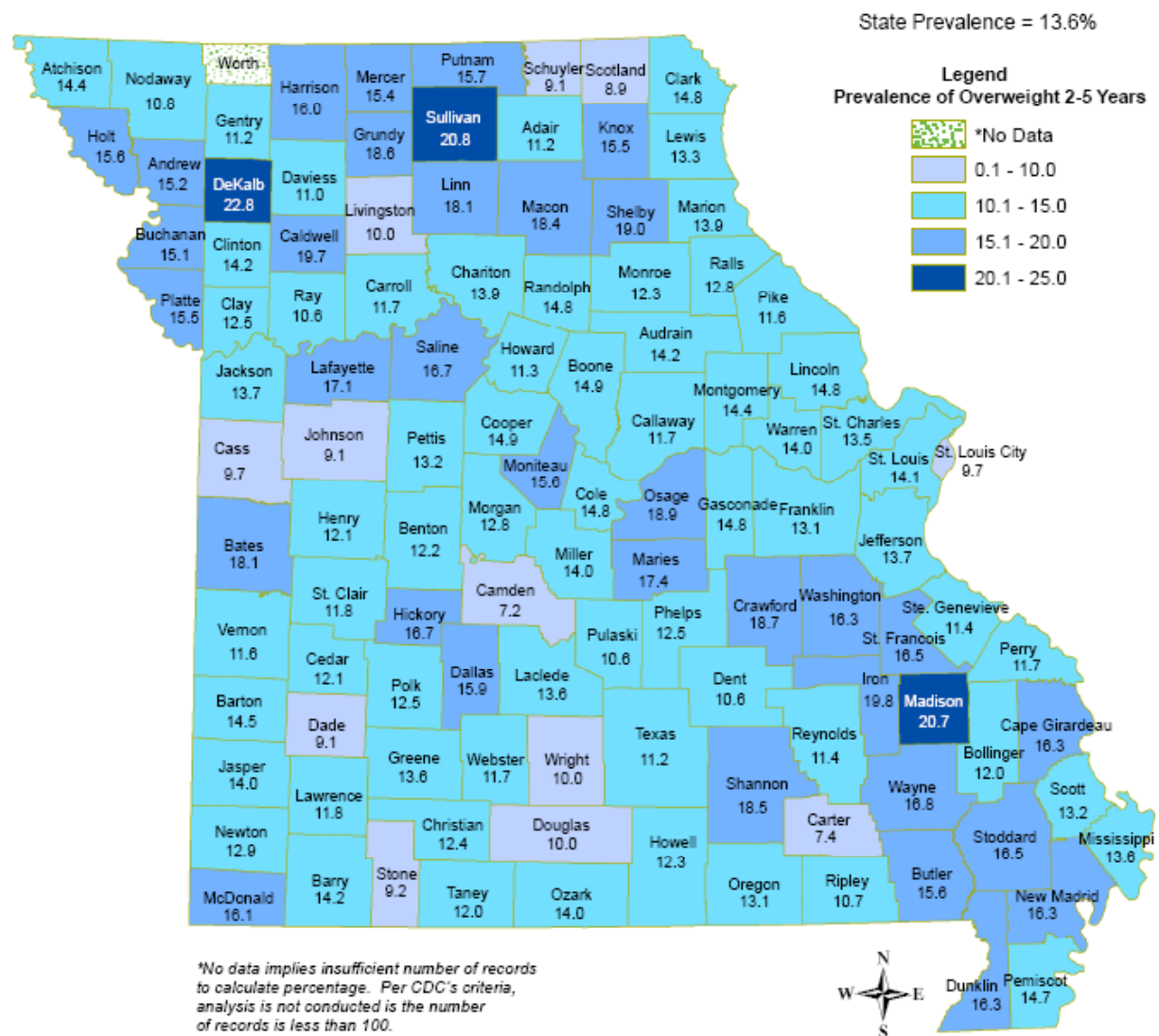
Appendix 5

Prevalence of Overweight 0-5 Years by County, Missouri PedNSS 2004-2006 Combined Years



Appendix 6

Prevalence of Overweight 2-5 Years by County, Missouri PedNSS 2004-2006 Combined Years



Appendix 7

Prevalence of At-Risk for Overweight 2-5 Years by County, Missouri PedNSS 2004-2006 Combined Years

